Preeclampsia Maternal Morbidity: How Can It Be Reduced?

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Conflict of Interest

- I have no conflicts of interest to declare relative to any of my talks
Preeclampsia: Objectives

• Know how to diagnose preeclampsia;
• Understand rationale for timing of delivery for women with preeclampsia.
• Know best antihypertensive agents to use for acute treatment of severe hypertension
Why Preeclampsia? Why Now?

- US maternal death increasing
- Hypertensive disorders significant
- Most deaths preventable
- Not enough deaths to study
- Severe morbidity preventable
- If we can better diagnose and manage preeclampsia should have less death/morbidity
Maternal Mortality Rate, California and United States; 1999-2010

<table>
<thead>
<tr>
<th>Year</th>
<th>California Rate</th>
<th>United States Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>9.9</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>10.9</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>9.9</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>9.7</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>8.9</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>12.1</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>11.8</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>11.7</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>14.0</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>16.8</td>
<td></td>
</tr>
</tbody>
</table>

**HP 2020 Objective – 11.4 Deaths per 100,000 Live Births**

Source: State of California, Department of Public Health, California Birth and Death Statistical Master Files, 1999-2010. Maternal mortality for California (deaths ≤ 42 days postpartum) was calculated using ICD-10 cause of death classification (codes A34, O00-O95, O98-O99) for 1999-2010. United States data and HP2020 Objective were calculated using the same methods. U.S. maternal mortality data is published by the National Center for Health Statistics (NCHS) through 2007 only. U.S. rates from 2008-2010 were calculated using NCHS Final Death Data (denominator) and CDC Wonder Online Database for maternal deaths (numerator). Accessed at [http://wonder.cdc.gov](http://wonder.cdc.gov) on April 17, 2013. Produced by California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division, April, 2013.
Causes of Death Subtle Change


Berg OG 2010;116:1
Why Evaluate Near Miss Cases?

- Maternal deaths have not decreased in US in > 20 years
- Not enough maternal deaths per institution to study
1.7 million women/year have maternal morbidity
  (Danel, 2003)
- Clear preventability issues

**Continuum of Morbidity**
• 40% deaths preventable factors
• 45% near misses preventable factors
• 17% severe morbidities preventable factors (p = .01)
• Clearly opportunity for slowing progression through the continuum at least from severe morbidity to worse
Provider Preventable Factors

• 87 – 93% of all cases with preventable factors had provider factors
• Failure to ID high risk: 13 – 29%
• Incomplete management: 82 – 93%
• No referral to tertiary: 0 – 7%

Geller, 2004b
Preventability Related to Cause

• High preventability
  ▪ Hemorrhage (93%)
  ▪ Preexisting chronic disease (89%)
  ▪ PIH (60%)
  ▪ Infection (43%)
  ▪ Cardiovascular (40%)

• Less preventability
  ▪ Choriocarcinoma (25%)
  ▪ Cardiomyopathy (22%)
  ▪ CVA (0)
  ▪ AFE (0)

Berg; 2005
More Practical Model to ID Near Miss

- Exclude organ system failure
- 2 factors
  - ICU admission and transfusion > 3 units
  - 100% sensitivity
  - 78% specificity
    - Pick up 36 extra near miss cases
    - Were classified as severe morbidity
- Can use a model to identify and analyze these patients

Geller, 2004a
Poor Outcome and Critical Pathways

Maternal Death

Near Misses: ICU admissions

Serious Morbidity

- Critical symptoms not recognized
- Delayed Diagnosis
- Delayed treatment
- Inadequate treatment
- Assumption delivery completely fix the problem
- Discharge without timely follow-up
Maternal Morbidity and Mortality: Preeclampsia

About 8 Preeclampsia Related Mortalities / Year in CA

Near Misses: 380/year (ICU admissions)

40-50x

400-500x

Serious Morbidity: 3400/year (prolonged postpartum length of stay)

Source: 2007 All-California Rapid Cycle Maternal/Infant Database for CA Births
How do women die of preeclampsia in CA?

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>Stroke</td>
<td>16</td>
<td>64.0%</td>
<td>1.0</td>
</tr>
<tr>
<td>Hemorrhagic</td>
<td>14</td>
<td>(87.5%)</td>
<td></td>
</tr>
<tr>
<td>Thrombotic</td>
<td>2</td>
<td>(12.5%)</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>
Major Morbidity – BP related

- Stroke
- Placental abruption
- Retinal detachment
- Cerebral edema/PRES
- Seizures
- Liver hematoma/rupture
- Acute renal failure
- DIC/hemorrhage
- Pulmonary edema
- Ascites pleural effusion
36 YO G1 at 40 Weeks

• Mild preeclampsia at 38 wks
• Induction recommended; patient declined
• Came in with “worst headache of life”
• BP 220/110
  – Hydralazine and magnesium started
• Pt stated she was going to seize
• BP 240/120
• Pt stated she was going to arrest
• Pt had left sided paralysis and became unarousable
Stroke and Preeclampsia

• Retro review of 28 pts 1980 – 2003 stroke related to preeclampsia/eclampsia
• No comparison group
• Only 2 with ch hypertension
• 54% died
• 64% HELLP

Martin, 2005
Results Stroke

• 93% arterial, hemorrhagic
• 96% had SBP > 160 pre stroke
• Mean SBP 175 + 10
• Mean DBP 98 + 9
• 12% had DBP > 110
• Concluded that severe SBP more common than severe DBP with stroke
• Recommended treat all with SBP 155-160
Eclampsia

• 2000 cases/yr in US
• 0.05 - 0.2% of all deliveries; has decreased from 1979 - 1986
• Severe preeclampsia: 2% vs 0.6% on mag
• Mild preeclampsia: 1/200
• Maternal mortality - 0 - 20%
  – series with low mortality used magnesium and immediate delivery (Pritchard, 84)
• PNM - 13 - 64%

Sibai; ajog 2004;190:1520
Eclampsia in CA 2001-07

- CA discharge data
  - 2.7 mil deliveries
  - 1888 with eclampsia
    - 8/10,000 deliveries 2001 – 5.6/10,000 2007
- Significant risks for eclampsia
  - AA: OR 1.8 (1.5 – 2.17); Hisp: 1.27 (1.14-1.42)
  - Preexisting heart dis 6.8 (5.4-8.7)
  - SLE 3.68 (1.5-8.9)

Fong ajog 2013
Risks With Eclampsia

- CVA/hemorrhage: OR 112 (77.5-162)
- PPCM: 12.9 (6.1-27.2)
- AFE: 11.9 (3.6-39.2)
- VTE: 10.7 (5.1-22.3)
- Death: 16.7 (8.1-34.6)
  - 16 maternal deaths/2534 eclamptics

Fong ajog 2013
Diagnosis of Preeclampsia

- SBP $\geq$ 140 or DBP $\geq$ 90
  - Previously normal BP
- Proteinuria $> 300$ mg/24 hr
- Associated with multiple other signs and symptoms

ACOG PB 2002; 33
No more mild preeclampsia

- This is actually not clearly in the executive summary
- Preeclampsia without severe features
- Preeclampsia with severe features

Obstet gynecol 2013;122:1122-31
Proteinuria eliminated from severe features

• Only need to assess proteinuria for initial diagnosis

• Can use 24 hour urine collection (> 300 mg/24 hr) or PC ratio of at least 0.3 (mg/dL) or if only have urine dip at least 1+

• But do not need any proteinuria for the diagnosis if woman has hypertension and any other severe features

• Once make diagnosis with proteinuria no need to follow
Severe Preeclampsia

- BP > 160/110
- Cerebral or visual disturbances
- Pulmonary edema
- Elevated LFTs, HELLP; epigastric pain, RUQ pain
- Thrombocytopenia
- Cr > 1.1 progressive renal insufficiency
With or without severe features?

- Directs urgency of delivery (cure)
- Consider signs and symptoms
- Determine gestational age
- Fetal assessment
Example of Diagnostic Error

- Evaluated accuracy of ICD-9 coding for preeclampsia
- Reviewed 135 charts and extracted correct diagnosis with acog criteria
- Compared to diagnosis given by ICD-9 code and evaluated who made error if there was one

Geller, AJOG 2004c;190:1629
Results ICD-9 Coding

- PPV for all: 54%
  - That patient really had what was coded
- PPV severe preeclampsia: 85%
- PPV mild preeclampsia: 45%
- PPV eclampsia: 42%
- Coding error: 82% with clinician error
Preeclampsia Quality Improvement Collaborative

Aims

- To reduce rate of severe morbidities in women with hypertension by 50% by Feb 2014:
- To reduce percentage of women with hypertension with prolonged length of stay by Feb 2014
CA Preeclampsia Quality Improvement Collaborative

- Baseline: July 1, 2012 – Jan 31, 2013
- Currently 26 hospitals participating
- Ongoing modification of process
- Recognition of difficulty of reducing morbidity
  - Very different than hemorrhage
Severe Preeclampsia in 2012

<table>
<thead>
<tr>
<th>Hospital</th>
<th>% SPre</th>
<th>Deliveries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Olive View</td>
<td>8.2</td>
<td>598</td>
</tr>
<tr>
<td>UCSF</td>
<td>8.1</td>
<td>1809</td>
</tr>
<tr>
<td>Cedars-Sinai</td>
<td>3.1</td>
<td>6583</td>
</tr>
<tr>
<td>Kaiser SF</td>
<td>4.5</td>
<td>2818</td>
</tr>
<tr>
<td>Kaiser LA</td>
<td>3.5</td>
<td>2452</td>
</tr>
<tr>
<td>Kaiser Oakland</td>
<td>3.3</td>
<td>2207</td>
</tr>
<tr>
<td>Kaiser Roseville</td>
<td>3.1</td>
<td>4932</td>
</tr>
</tbody>
</table>
Types of Measures

- **Outcome measures**
  - Are changes leading to improvements
    - Severe morbidity
    - Prolonged LOS

- **Process measures**
  - Identify changes to processes of care that affect outcome
    - Treat hypertension within 30 - 60 minutes of confirmed hypertension
    - Debrief on all cases severe hypertension

- **Balancing measures**
  - Identify changes on one area that might result in new problems elsewhere
    - “hypotension” after antihypertensive RX (DBP < 80 within 1 hr)
Outcome Measures: Revised Denominator

**Measure #1: Severe Morbidities**

- Women with Morbidities
- Women with Severe Preeclampsia/Eclampsia/Superimposed

**Measure #2: Prolonged PPLOS**

- Women with Prolonged PPLOS (Vag/CS)
- Women with Severe Preeclampsia/Eclampsia/Superimposed
### Severe Morbidity Numerator: (Callaghan 2012, Kuklina 2008)

<table>
<thead>
<tr>
<th>Condition</th>
<th>ICD-9 Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Renal Failure</td>
<td>669.3, 584</td>
</tr>
<tr>
<td>Pulmonary Edema</td>
<td>518.4, 428.1</td>
</tr>
<tr>
<td>Adult Respiratory Distress Syndrome</td>
<td>518.5, 518.81, 518.82, 518.84, 799.1</td>
</tr>
<tr>
<td>Puerperal Cerebrovascular Disorder</td>
<td>674.0, 671.5, 430, 431, 436, 432.x, 433.x, 434.x, 437.x, 997.2, 999.2</td>
</tr>
<tr>
<td>Disseminated Intravascular Coagulation Syndrome</td>
<td>286.6, 286.9, 666.3</td>
</tr>
<tr>
<td>Ventilation</td>
<td>93.90, 96.01-96.05, 96.7x</td>
</tr>
<tr>
<td>Postpartum Hemorrhage</td>
<td>666.00-666.34</td>
</tr>
<tr>
<td>Abruptio Placentae</td>
<td>641.20, 641.21, 641.23</td>
</tr>
</tbody>
</table>

- Those in blue were ICD9 codes for SMM that Callaghan used
- Those in green (PPH, abruption) were added by Expert Panel

BUT these now appear to complicate the analysis….

- PPH is quite common and overwhelms other codes
- Is PPH really a complication of the preeclampsia?
- Do we really expect to see decrease in PPH with appropriate antihypertensive treatment?
Preeclampsia Toolkit BP Treatment Recommendations

| Systolic ≥ 160 | Diastolic ≥ 105-110 | Repeat and Treatment within 60 minutes (ideally ASAP) | ≥155 | Alternative trigger* |

Repeat BP 10-15 min; time from confirmatory BP is what is tracked

* Based on Martin 2005
Why and How Debrief

• Use brief form
• Should be timely and easy to do
• Should provoke awareness
• Should provoke ideas about improving recognition and management
Transforming Maternity Care

Process 2. Severe Case Debrief

Baseline Period

Active Collaborative

Collaborative Baseline Average: 1.2%

Preeclampsia Collaborative Rate

CMQCC
Prolonged Postpartum LOS

Outcome 2. PPLOS with Pre/eclampsia

Collaborative Baseline Average: 7.2%

Follow-up: 6.3%

CMQCC : Transforming Maternity Care
Medication Timing

Treatment within 60 minutes: Increasing!

- Nov 2012 (Baseline): 39.1%
- Nov 2013 (Collaborative): 58.1%

CMQCC : Transforming Maternity Care
Timely Treatment: within 60 minutes

Process 1: Timely Treatment for Severe Hypertension

Collaborative Baseline Average: 43.3%
Why Treat These BPs?

• Reduce morbidities
  - Stroke is rare
  - Can we measure a benefit?
  - LOS
• Educate all staff re recognition of preeclampsia
  - Can we measure this?
Transforming Maternity Care

Antihypertensive Treatment Given

1. Goals: More “Green” and less “Yellow”
2. Unsure what to do with Red without knowing the reason
<table>
<thead>
<tr>
<th>Reason</th>
<th>Percent</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP stabilized before medication could be given</td>
<td>48.8%</td>
<td>20</td>
</tr>
<tr>
<td>MD disagrees with BP parameters</td>
<td>29.3%</td>
<td>12</td>
</tr>
<tr>
<td>MD preference for oral medications instead of IV</td>
<td>24.4%</td>
<td>10</td>
</tr>
<tr>
<td>MD not available</td>
<td>12.2%</td>
<td>5</td>
</tr>
<tr>
<td>Competing priorities (ie. ultrasounds, labs, magnesium sulfate admin.)</td>
<td>22.0%</td>
<td>9</td>
</tr>
<tr>
<td>Fear of hypotension</td>
<td>12.2%</td>
<td>5</td>
</tr>
<tr>
<td>RN's reluctant to give IV antihypertensives</td>
<td>19.5%</td>
<td>8</td>
</tr>
<tr>
<td>Difficulty obtaining medication within 30 min</td>
<td>24.4%</td>
<td>10</td>
</tr>
<tr>
<td>Lack of knowledge regarding treatment parameters.</td>
<td>48.8%</td>
<td>20</td>
</tr>
<tr>
<td>Magnesium sulfate treatment given as treatment</td>
<td>34.1%</td>
<td>14</td>
</tr>
</tbody>
</table>
Balance Measure: Diastolic BP <80 within 1 hour after BP Treatment

- No one knows…
  - How frequently does this occurs?
  - How frequently does it causes problems?
  - Is it the absolute fall of BP or a fall below a specific level?
  - How much of a fall or what level?

- The collaborative can address these questions
Diastolic <80 within 1 hour of antihypertensive medications given

Anecdotally, the lower BP has not led to increased fetal issues

Baseline Period

Active Collaborative

15-20% of treated mothers have dBPs that fall below 80mmHg

Collaborative Baseline Average: 15.3%
Treatment Acute Hypertension

- >160/105-110 persistent
- Labetalol
  - Use maximum of 80 (160) mg acutely
  - Peak action in 5 min IV
- Hydralazine
  - Has delayed onset of action (20 min) so be wary of delayed maternal hypotension
Hydralazine (smooth mm relaxant)

- 5 or 10 mg IV over 10 min
- Repeat in 20 min if still high 10 mg IV
- Repeat in 20 min if still high switch to labetalol 20 mg IV
- Repeat in 10 min if still high 40 mg IV and consult
Box 1. Order set for Severe Intrapartum or Postpartum Hypertension

Initial First-Line Management with Labetalol

1. Notify physician if SBP greater than or equal to 160 mm Hg or if DBP is greater than or equal to 110 mm Hg.
2. Institute fetal surveillance if undelivered and fetus is viable.
3. Administer labetalol (20 mg IV over 2 min).
4. Repeat BP in 10 min and record results.
5. If either BP threshold is still exceeded, administer labetalol (40 mg IV over 2 min). If BP is below threshold, continue to monitor BP closely.
6. Repeat BP in 10 min 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 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 in 20 min 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.
13. Once the BP thresholds achieved, repeat BP every 10 min for 1 hr, then every 15 min for 1 hr, then every 30 min for 1 hr, and then every hour for 4 hrs.
14. Institute additional BP timing per specific order.

Am J Obstet Gynecol 2000;183:S1-S22. ACOG; Committee Opinion No. 514
Box 2. Order Set for Severe Intrapartum or Postpartum Hypertension Initial First-Line Management with **Hydralazine**

1. Notify physician if SBP greater than or equal to 160 mm Hg or if DBP greater than or equal to 110 mm Hg.
2. Institute fetal surveillance if undelivered and fetus viable.
3. Administer hydralazine (5 mg or 10 mg IV over 2 min).
4. Repeat BP in 20 minutes and record results.
5. If either BP threshold is still exceeded, administer hydralazine (10 mg IV over 2 min). If BP is below threshold, continue to monitor BP closely.
6. Repeat BP in 20 minutes and record results.
7. If either BP threshold is still exceeded, administer labetalol (20 mg IV over 2 min). If BP is below threshold, continue to monitor BP closely.
8. Repeat BP in 10 minutes and record results.
9. If either BP threshold is still exceeded, administer labetalol (40 mg IV over 2 min) and obtain emergency consultation from maternal-fetal medicine, internal medicine, anesthesia, or critical care specialists.
10. Give additional antihypertensive medication per specific order.
11. Once BP thresholds achieved, repeat BP every 10 min for 1 hr, then every 15 min for 1 hr, then every 30 min for 1 hr, then then every hr for 4 hr.
12. Institute additional BP timing per specific order.

*ACOG; Committee Opinion No. 514*
Labetalol (alpha and beta blocker)

- 20 mg IV over 2 min
- Repeat BP in 10 min if still elevated 40 mg
- Repeat in 10 min, if still elevated 80 mg
- Repeat in 10 min, if still elevated switch to hydralazine (10 mg IV over 2 min)
- Repeat in **20 min** if still elevated consult
- Once BP stable repeat q 10 min for 1 hr, q 15 min for 1 hr, then q 30 min for 1 hr, then q 4 hr
Nifedipine

• 10 mg PO
• RCT nifedipine (10 mg PO; 20) vs labetalol (20 IVP; 40, 80, 80)
  • repeat q 20 min
  • Mean time to control BP sig shorter nifed
    • 25 min + 14 vs 44 + 25; p=.002

Vermillion, 1999
Hypertensive Medication Administration
Oral v. IV

- IV Labetalol
  - Onset: 2-5 min
  - Peak: 5 min

- IV Hydralazine
  - Onset: 10-20 min
  - Peak: 10-80 min

- PO Labetalol:
  - Onset: 20 min-2 hrs
  - Peak: 1-4 hrs

- PO Nifedipine
  - Onset: 20 min
  - Peak: 4 hrs
PO Nifedipine v. IV Labetalol
Systolic Pressure

Ajog 1999;181:858-61
PO Nifedipine v. IV Labetalol
Diastolic Pressure
Magnesium Sulfate and Nifedipine

3029 received Nifedipine for BP treatment

1469
  ↓
Magnesium
  ↓
Hypotension 0.4%

1560
  ↓
No Magnesium
  ↓
Hypotension 0.3%

Magpie Trial: Lancet 2002; 359:1877
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></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 Group</td>
<td>145 ±10</td>
<td>143 ±13</td>
<td>141 ±14</td>
<td>87 ±10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>79 ±9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>82 ±9</td>
</tr>
</tbody>
</table>

Magnesium sulfate should **not** be considered a **antihypertensive** medication

Postpartum Hypertension

• Prevalence: 0.3 – 27%
• Etiology; most common
  - Persistent gestational hypertension
  - New onset preeclampsia
  - Persistent chronic hypertension

Sibai AJOG 2012; 206:470-5
Postpartum Blood Pressure

• Initially declines
• Rises and **peaks pp days 3 – 6**
  – Maybe due to naturesis and increased ANP release
• 12% women with no antepartum hypertension DBP > 100 pp (walters 1986)
• 50% women with preeclampsia BP > 150/100 pp (walters 1987)
Persistence of PP Hypertension

- BP becomes normal (< 140/90) by
  - Gestational htn: 6 days
  - Preeclampsia: 16 days

Ferrazzani, 1994
How Should PP Hypertension Be Treated?

- Poor data
- 2009 Cochrane review
  - Only 2 RCTs (1966 – 2009)
  - Compared IV hydralazine to IV labetalol to subl nifedipine; no control groups
  - No difference in subsequent medication need

Magee, 2009
Postpartum Management

• NIH: Continue medications for 3 – 4 wks
  ▪ Check BP weekly for 1 month
  ▪ CA toolkit: 72 hrs if on meds
    • 3-7 days if not
  ▪ Then q 3 – 6 months
  ▪ Then q year
• Continue medication if indicated
  ▪ Have patient check BPs at home
  ▪ F/u in office 2 – 4 wks
What BP Should Be Treated PP?

- Tan (2002), Sibai (2012), 2013 ACOG task force expert opinion only
  - >150 or > 100 in first 4 days
Recommended evaluation and management of women with postpartum hypertension

Persistent hypertension postpartum

- Detailed history & physical examination
- Presence of cerebral/gastrointestinal symptoms
- Laboratory evaluation including proteinuria

Hypertension only
- Stop vasoactive drugs
- Antihypertensive drugs

Response to treatment
- Yes
  - Evaluate for arterial stenosis & adrenal tumors
  - Seek consultation
- No

Hypertension plus
- Heart failure
- Palpitations, tachycardia
- Anxiety, short breath

Hypertension plus evaluation for:
- Thyrotoxicosis
- Cardiomyopathy
- Pheochromocytoma

Response to treatment
- Yes
  - Treat accordingly
  - No further evaluation

No further evaluation
- Neurologic consultation
- Cerebral imaging

Hypertension plus
- Proteinuria
- Cerebral symptoms
- Convulsions

Response to treatment
- Yes
  - Neurologic consultation
  - Cerebral imaging
- No further evaluation

Hypertension plus
- Recurrent symptoms
- Neurologic deficits

Response to treatment
- Yes
  - Consultation & evaluation for:
    - Exacerbation of lupus
    - TTP/HUS
    - APAS
    - AFLP
- No further evaluation

Hypertension plus
- Nausea/vomiting
- Epigastric pain
- Elevated liver enzymes
- Low platelets

Response to treatment

Sibai. AJOG 2012;206:470-5.
Breastfeeding

- OK to use
  - Aldomet
  - Hydralazine
  - Labetalol
  - Nifedipine

- Not OK to use
  - Atenolol
  - Metoprolol
  - Nadolol
  - ACE inhibitors
  - Diuretics
Hypertension Exacerbators

• Methergine
• Nonsteroidal medications
  – Vasoconstriction, sodium and water retention
  • Indomethacin
  • Ibruprofen
• Anticongestants

Maternal Mortality Rate, California and United States; 1999-2010
What to Remember

• Women still die from preeclampsia
  ▪ Still develop severe maternal morbidity
• We need to improve outcomes
• We need to make the right diagnosis and management

• Myths
  ▪ Epidural is effective treatment for severe hypertension
  ▪ Magnesium is effective treatment for severe hypertension
Management of Suspected Preeclampsia

• Timely confirmation of diagnosis
  - Gestational hypertension vs. preeclampsia
  - Urine dip vs. 24 hr urine
    • > 2+ on clean catch or > 1+ on cath
    • PC ratio
  - CBC, AST, ALT, Cr, ?Uric acid
  - Symptom review
• Hospitalize or not for diagnosis?
Acute Maternal Management

• Fluid Management
  ▪ Adequate IV fluids (isotonic)
  ▪ Careful Ins and outs
    • Intravascular volume depleted
• Intermittent labs
  ▪ CBC for platelets, Cr
• Eclampsia prophylaxis; magnesium
  ▪ Debate about mild preeclampsia
• BP treatment if necessary
Fetal Assessment

• Ultrasound for gestational age
• Rule out IUGR
• Rule out oligohydramnios
• Dopplers if IUGR
• Continuous fetal monitoring while making diagnosis, if severe or in labor
Delivery Indications

• Balancing maternal risk of staying pregnant with fetal/neonatal risk of delivery

• Sicker the mother earlier delivery

• Older the fetus less sick mother should be for delivery
Indications for Delivery

• Maternal
  ▪ > 37 wks (any) ACOG tf says 37 0/7 wks
  ▪ With severe features >34 wks

• Fetal
  ▪ Severe IUGR (not defined)
  ▪ Non-reassuring fetal testing results (not clarified)
  ▪ Oligohydramnios
Hypertension in Pregnancy 2013 Executive Summary

• Task force convened 2010
• Represents ACOG
• 17 clinician scientists
  – OB GYN, MFM, Nephrology, Hypertension, Internal Medicine, Anesthesiology, Physiology, patient advocacy
  – Chair: Dr. Jim Roberts
• Executive summary
• Full report

OG 2013;122:1122-31
Strategy of Taskforce

• Evaluated evidence “..regarding a clinical decision that, because of limited time and resources, would be difficult for the average health care provider to accomplish.”

• Made recommendations based on evidence consistent with “typical patient values and preferences.”
Graded Recommendations

• **Quality** of evidence (confidence in estimates of effect)
  – Very low, low, moderate, high

• **Strength** of recommendation
  – Strong
    • So well supported “…approach appropriate for virtually all patients.”
  – Qualified
    • “one that would be judged as appropriate for most patients, but it might not be the optimal recommendation for some (whose values and preferences differ, or who have different attitudes toward uncertainty in estimates of effects).”
Issues That Warrant Special Attention

• Failure by health care providers to appreciate the multi-systemic nature of preeclampsia

• Preeclampsia is a dynamic process
Results of Taskforce

• 60 (yes 60) recommendations
  – Number with high quality rating: 6
  – Number with low quality rating: 23
  – Number with very low: 0
  – Number with qualified strength rating: 34

• Really only 13 new or newish recommendations
• 3 new definition changes
  – Difficult to get from summary
Three Definition Changes

1. Eliminated dependence of diagnosis of preeclampsia on proteinuria

2. No more mild preeclampsia

3. Proteinuria eliminated as a severe feature
1. Eliminated dependence of diagnosis of preeclampsia on proteinuria

Do not need to have proteinurias for diagnosis
- Not really new….but
- In absence of proteinurias, hypertension with any of these = preeclampsia
  - Plts < 100k
  - Impaired LFTs (twice normal)
  - New renal insufficiency Cr > 1.1 mg/dL
  - Pulmonary edema
  - New onset visual or cerebral findings
2. No more mild preeclampsia

• This is actually not in the executive summary

• Preeclampsia without severe features

• Preeclampsia with severe features
3. Proteinuria eliminated from severe features

- Only need to assess proteinuria for initial diagnosis
- Can use 24 hour urine collection (> 300 mg/24 hr) or PC ratio of at least 0.3 (mg/dL) or if only have urine dip at least 1+

- But do not need any proteinuria for the diagnosis if woman has hypertension and any other severe features
- Once make diagnosis with proteinuria no need to follow
New Recommendations (1)

• History of preeclampsia and delivery < 34 wks or preeclampsia in more than 1 pregnancy give aspirin (60 – 80 mg) PO q day beginning in late first trimester

• Quality of evidence: moderate
• Strength of recommendation: qualified
Women with gestational hypertension or preeclampsia without severe features, it is suggested that strict bed rest NOT be prescribed.

• Quality of evidence: low
• Strength of recommendation: qualified
New Recommendations (3)

• Mild gestational hypertension or preeclampsia without severe features at or beyond 37 0/7 wks, delivery rather than continued observation is suggested

• Quality of evidence: moderate
• Strength of recommendation: qualified
New Recommendations (4)

• Women with **preeclampsia** with SBP < 160 and DBP < 110 and no maternal symptoms, it is suggested that magnesium sulfate **NOT** be administered universally for prevention of eclampsia

• Quality of evidence: low
• Strength of recommendation: qualified
Women with gestational hypertension, preeclampsia, or superimposed preeclampsia, it is suggested that BP be monitored in the hospital or that equivalent outpatient surveillance be performed for at least 72 hours postpartum and again at 7-10 days after delivery.

• Quality of evidence: moderate
• Strength of recommendation: qualified
New Recommendations (6)

• For all postpartum women it is suggested that discharge instructions include information about the signs and symptoms of preeclampsia as well as importance of prompt reporting of them to provider

• Quality of evidence: low
• Strength of recommendation: qualified
New Recommendations (7)

- Women with persistent pp hypertension \( BP > 150/100 \) on at least 2 occasions that are 4-6 hrs apart, antihypertensive therapy is suggested. Persistent \( BP \geq 160/110 \) should be treated within 1 hour

- Quality of evidence: low
- Strength of recommendation: qualified
New Recommendations (8)

• Pregnant women with **persistent chronic** hypertension with SBP \( \geq 160 \) or DBP \( \geq 105 \), antihypertensive therapy is recommended

• Quality of evidence: moderate
• **Strength of recommendation: strong**
New Recommendations (9)

• Pregnant women with chronic hypertension with SBP < 160 or DBP < 105 and no evidence of end organ damage, it is suggested that they NOT be treated with pharmacologic antihypertensive therapy

• Quality of evidence: low
• Strength of recommendation: qualified
New Recommendations (10)

• For initial treatment of pregnant women with chronic hypertension who require pharmacologic therapy, labetalol, nifedipine, or methyldopa are recommended

• Quality of evidence: moderate
• Strength of recommendation: strong
• Women with chronic hypertension with greatly increased risk of adverse pregnancy outcomes (history of early onset preeclampsia and preterm delivery < 34 wks or preeclampsia in more than 1 pregnancy, daily aspirin (60 – 80 mg) beginning in late first trimester is suggested

• Quality of evidence: moderate
• Strength of recommendation: qualified
New Recommendations (12)

- Women with **chronic hypertension** complicated by issues such as need for medication, other underlying medical conditions that affect fetal outcome, or any evidence of fetal growth restriction, or superimposed preeclampsia antenatal fetal testing is suggested

- Quality of evidence: low
- Strength of recommendation: qualified
New Recommendations (13)

• Women with **history of preeclampsia** who gave birth < 37 wks or who have history of recurrent preeclampsia, yearly assessment of BP, lipids, fasting blood glucose, BMI is suggested

• Quality of evidence: low
• Strength of recommendation: qualified
High Quality of Evidence Recommendations (6)
All also have strong strength recommendation

- Vitamin C or E to reduce risk preeclampsia NOT recommended
- Severe preeclampsia receiving expectant management < 34 wks administration of corticosteroids for fetal lung maturity recommended
- Eclampsia: magnesium sulfate recommended
- Severe preeclampsia: magnesium sulfate recommended
- HELLP before fetal viability: recommended delivery shortly after initial maternal stabilization
- Superimposed preeclampsia with expectant management < 34 wks: corticosteroids for lung maturity recommended