



# **Hypertension Disorders of Pregnancy and Postpartum: Approaching Care through a Quality Lens**

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2/14/2022

# Learning Objectives

- Appreciate patients that may be at risk for development of severe hypertension episodes in pregnancy and postpartum
- Appropriately initiate timely antihypertensive therapy, coadministration of magnesium sulfate, and additional appropriate ancillary care
- Work towards fostering a culture of patient safety with debriefs, huddles, and reviews of cases involving severe maternal morbidity to identify opportunities for change
- Consider the disparities that at-risk populations have for adverse outcomes including persons of color, lower socioeconomic status, and limited healthcare literacy

# Disclosures

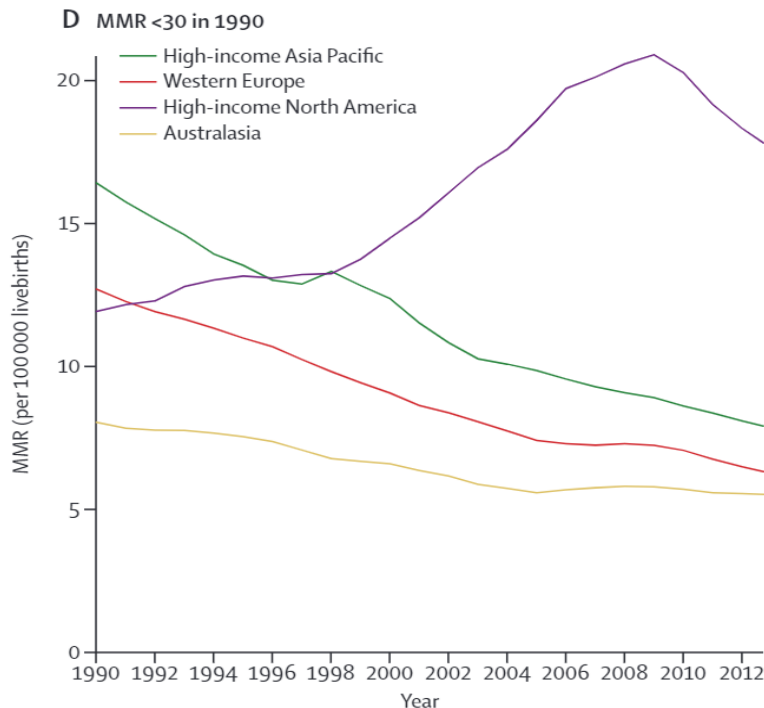
- Grant-funded
  - HRSA/ODH Grant-Funded – Maternal Hypertension and Urgent Maternal Warning Signs
  - PHII/CDC Grant-Funded – Maternal and Infant Network to Understand Outcomes Associated with Treatment for Opioid Use Disorder during Pregnancy
- No other financial disclosures to make

# Background

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# Global, regional, and national levels and causes of maternal mortality during 1990–2013

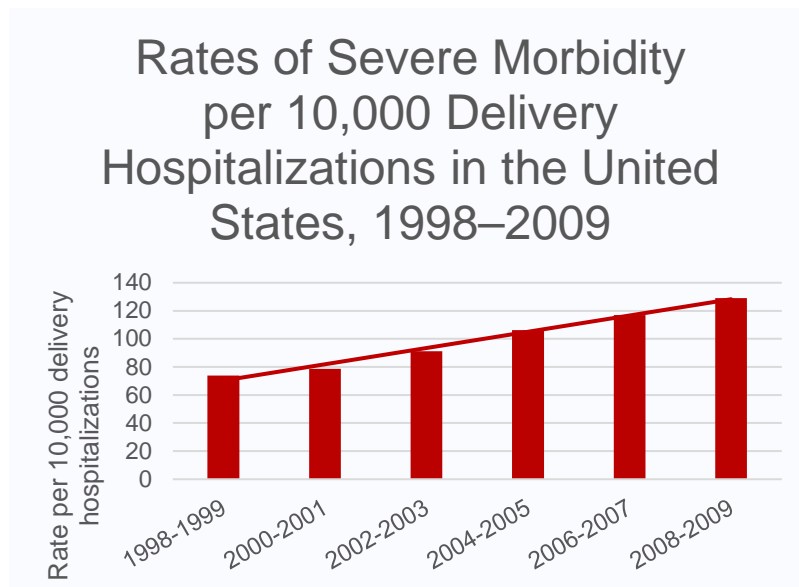
- Maternal mortality rate (MMR) in high-income North-America has been on rise between 1990 and 2013
- United States is primary driver with a 1.7% annualized rate of change in MMR (per 100K livebirths)
  - 12.4 (1990) to 18.5 (2013)
  - Canada with 0.6% increase over same period (7.1 to 8.2)



Kassenbaum et al. *Lancet*. 2014 September 13; 384(9947): 980–1004

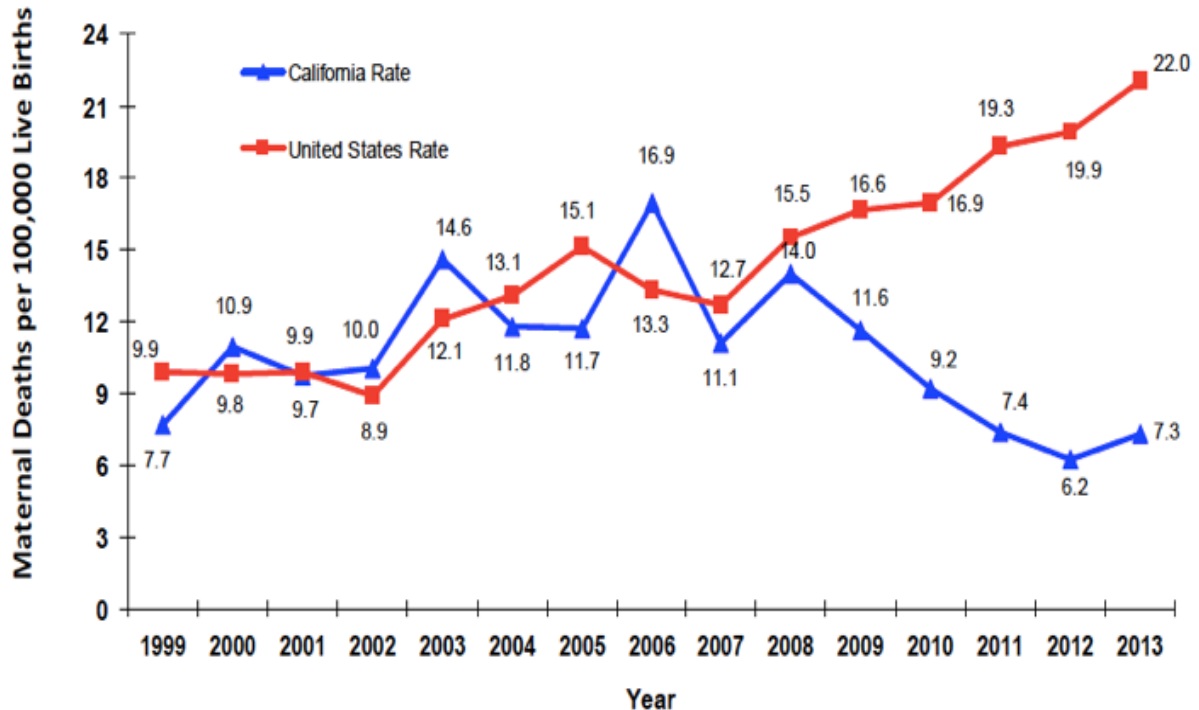
# Severe maternal morbidity among delivery and postpartum hospitalizations in the United States

- Severe maternal morbidity increased by 75% and 114% over 10 years for delivery and postpartum hospitalizations between 1998-1999 and 2008-2009
- Trends expect increase in burden



Callaghan WM et al. Obstet Gynecol 2012

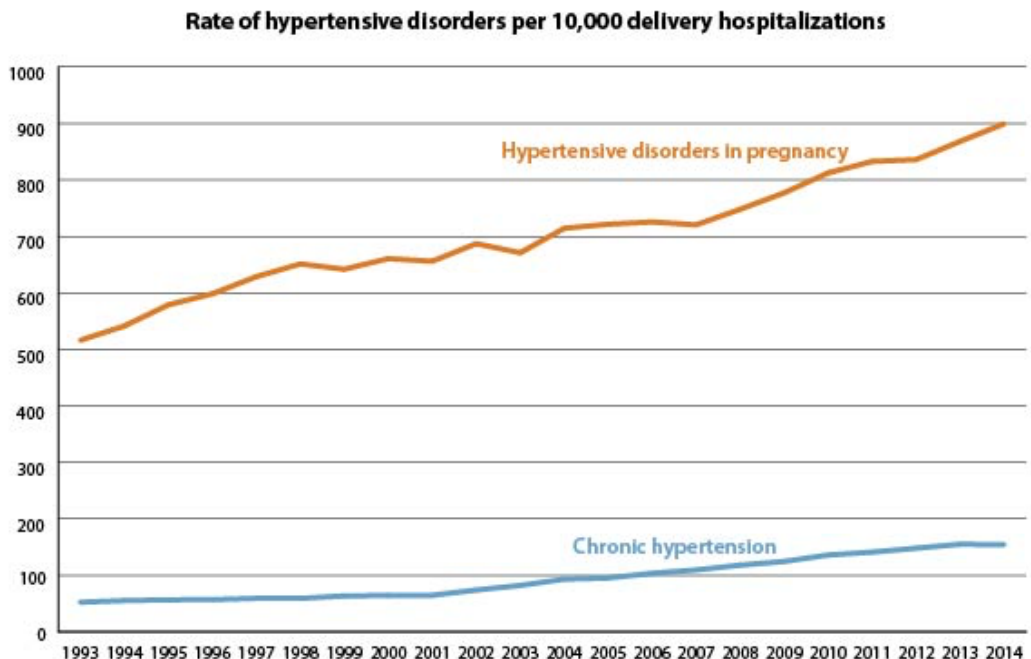
# Maternal Mortality Rate, California and United States; 1999-2013



# Impact of Hypertension

- Hypertension is recognized as one of the leading causes of pregnancy-related death
  - True, whether antepartum, intrapartum, or postpartum
- Incidence of preeclampsia has increased 25% over last two decades
- For every maternal death there are 50-100 near misses
- Appears that there may be potential for intervention

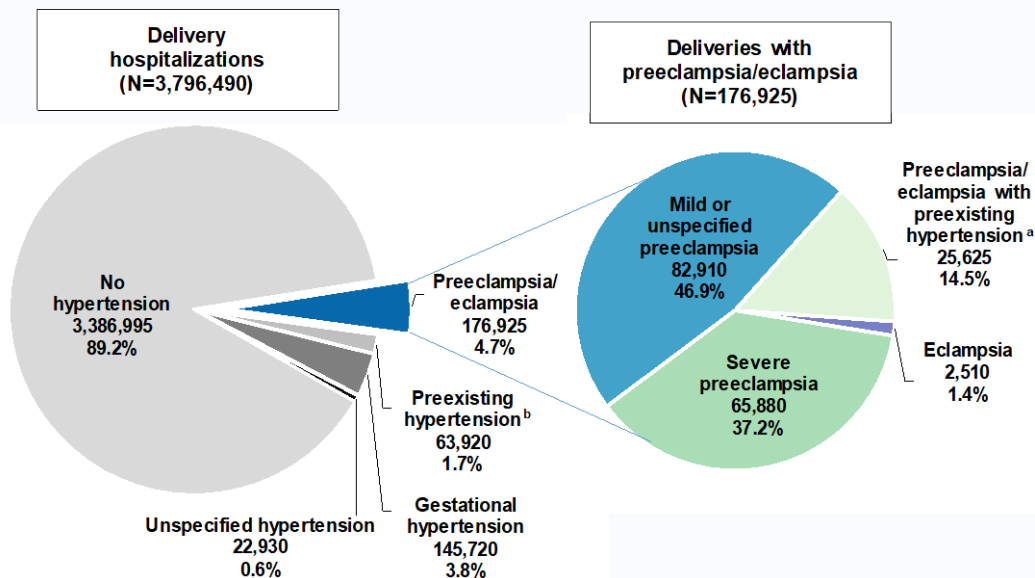
# *Hypertensive Disorders 1993-2014*



<https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-complications-data.htm>

# Prevalence of delivery hospitalizations involving preeclampsia/eclampsia, 2014

Figure 1. Hypertension-related diagnoses among delivery hospitalizations, 2014

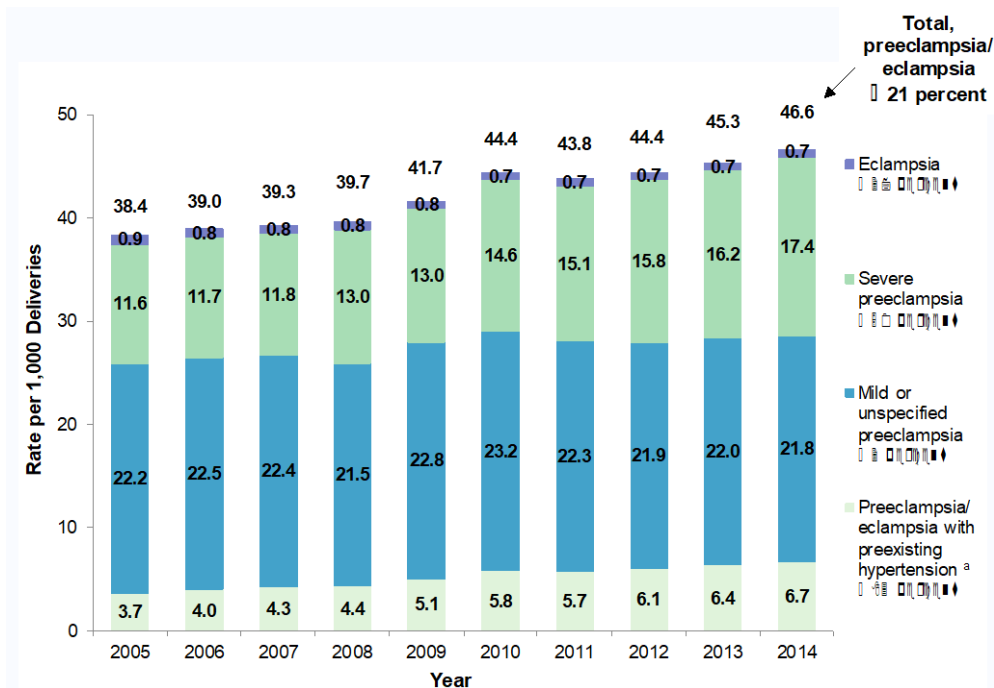


<sup>a</sup> Records with ICD-9-CM diagnosis code 642.7, which indicates that preeclampsia or eclampsia was present with preexisting hypertension but does not specify the severity of the condition.

<sup>b</sup> Preexisting hypertension without preeclampsia or eclampsia.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2014

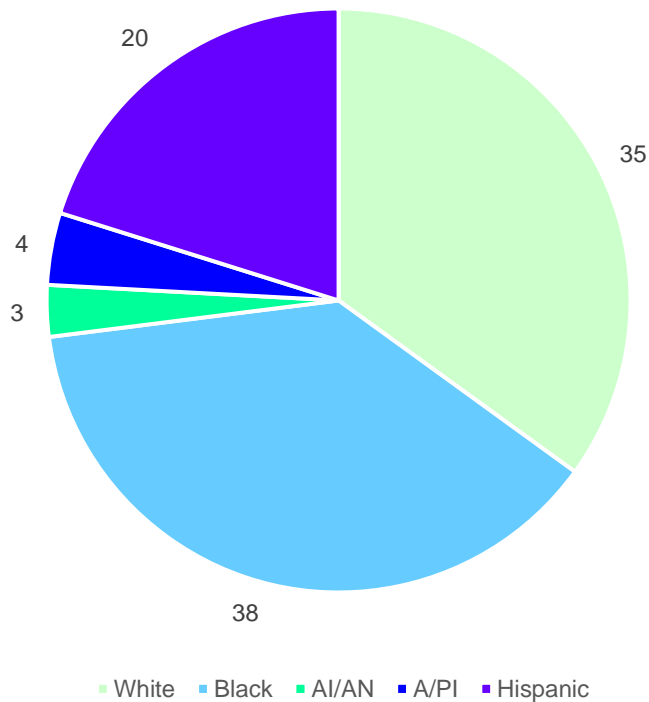
# Rate of preeclampsia/eclampsia among delivery hospitalizations, 2005–2014



<sup>a</sup> Records with ICD-9-CM diagnosis code 642.7, which indicates that preeclampsia or eclampsia was present with preexisting hypertension but does not specify the severity of the condition.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National (Nationwide) Inpatient Sample (NIS), 2005–2014

## Pregnancy-related mortality by race/ethnicity for hypertensive disorders of pregnancy, 2007-2016



# Terminology

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# Hypertensive Disorders in Pregnancy and Postpartum

Table 1. American College of Obstetricians and Gynecologists Definitions of Hypertensive Disorders

Disorder	Definition
Hypertension in pregnancy	Systolic blood pressure $\geq$ 140 mm Hg or diastolic BP $\geq$ 90 mm Hg, or both, measured on two occasions at least 4 hours apart
Severe-range hypertension	Systolic blood pressure $\geq$ 160 mm Hg or diastolic BP $\geq$ 110 mm Hg, or both, measured on two occasions at least 4 hours apart
Chronic hypertension	Hypertension diagnosed or present before pregnancy or before 20 weeks of gestation; or hypertension that is diagnosed for the first time during pregnancy and that does not resolve in the postpartum period
Chronic hypertension with superimposed preeclampsia	Preeclampsia in a woman with a history of hypertension before pregnancy or before 20 weeks of gestation

Practice Bulletin 203 – Chronic Hypertension in Pregnancy

# Diagnostic Criteria

## Blood pressure

- Systolic blood pressure of 140 mm Hg or more or diastolic blood pressure of 90 mm Hg or more on two occasions at least 4 hours apart after 20 weeks of gestation in a woman with a previously normal blood pressure
- Systolic blood pressure of 160 mm Hg or more or diastolic blood pressure of 110 mm Hg or more. (Severe hypertension can be confirmed within a short interval (minutes) to facilitate timely antihypertensive therapy).

## Proteinuria

- 300 mg or more per 24 hour urine collection (or this amount extrapolated from a timed collection) or
- Protein/creatinine ratio of 0.3 mg/dL or more or
- Dipstick reading of 2+ (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  $100,000 \pm 10^9/L$
- 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
  - New-onset headache unresponsive to medication and not accounted for by alternative diagnoses or visual symptoms

## Practice Bulletin 202 – Gestational Hypertension and Preeclampsia

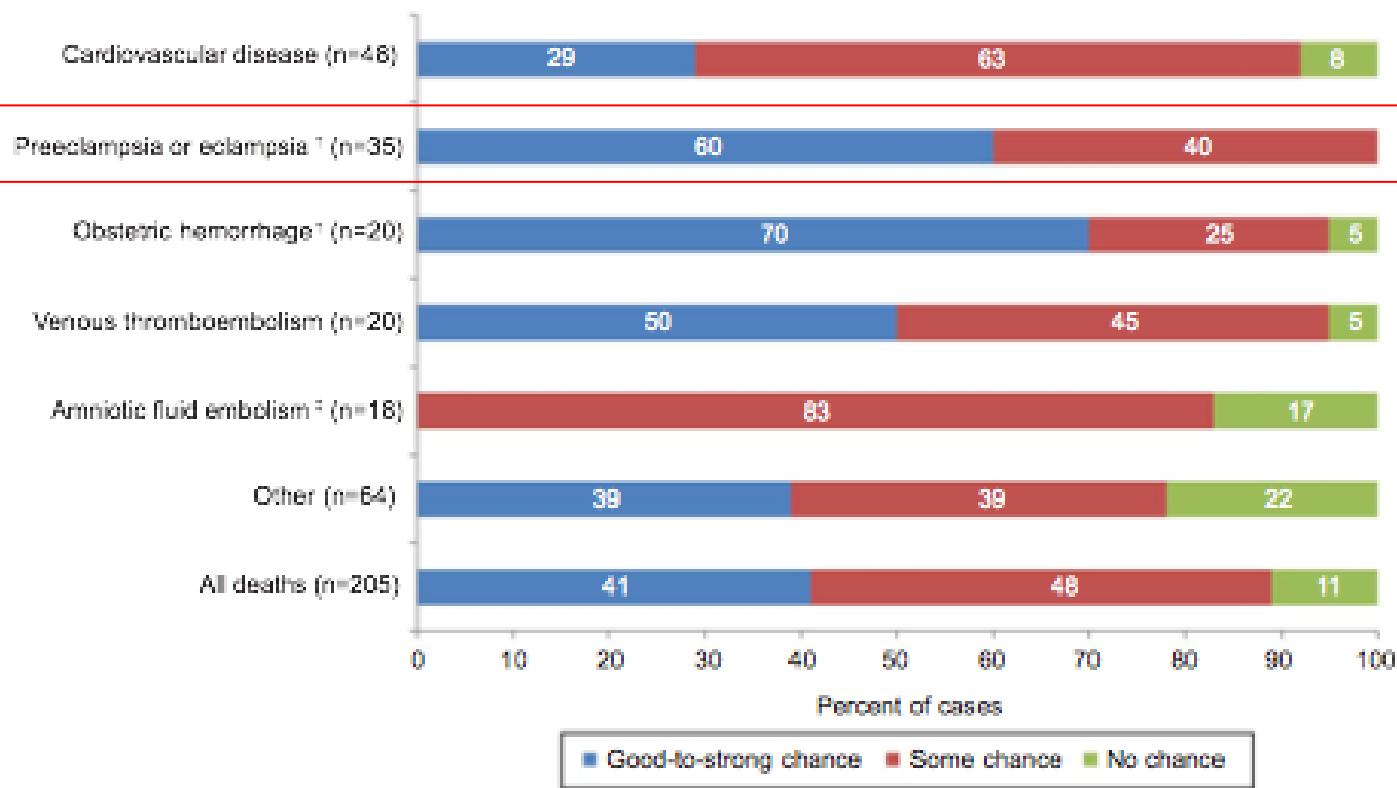
# Defining Severely Elevated Blood Pressures

- Defined as:
  - Persistent (two or more BPs) within 15 minutes
  - Either SBP  $\geq 160$  or DBP  $\geq 110$
- Associated with higher rates of maternal morbidity and mortality when persistently elevated ( $\geq 15$  minutes between measures)
  - Including:
    - Cerebrovascular disease
    - Disseminated intravascular coagulation
    - Pulmonary edema
    - Acute kidney injury
    - Postpartum hemorrhage

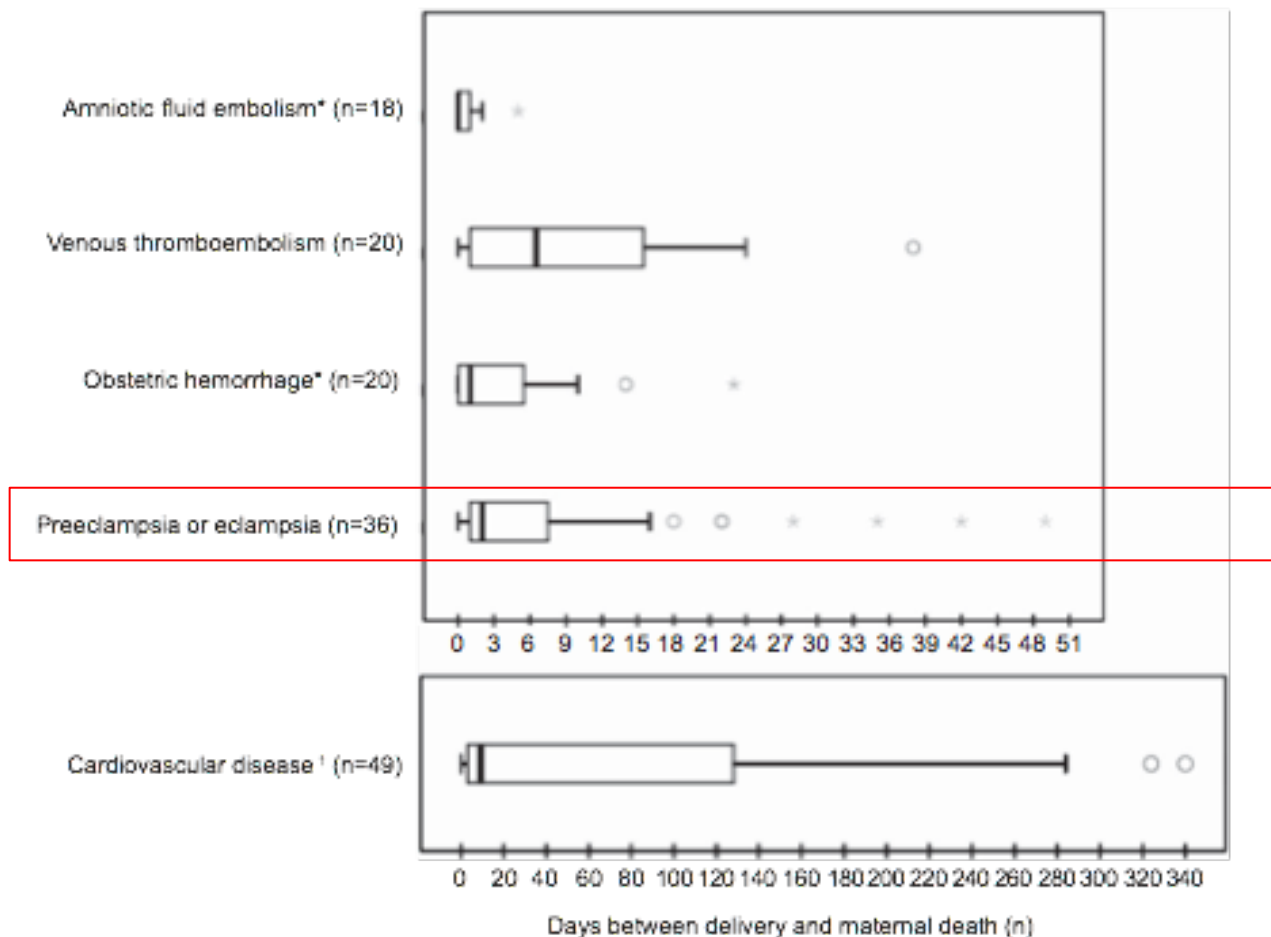
Committee Opinion 767 - Emergent Therapy for Acute-Onset, Severe Hypertension During Pregnancy and the Postpartum Period

# Quality Improvement on Hypertension in Pregnancy and Postpartum

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Main EK et al, Obstet Gynecol, 2015



# Factors contributing to pregnancy-related death from preeclampsia or eclampsia

- Healthcare provider
  - Delayed response to clinical warning signs – 90%
  - Ineffective care – 68%
  - Misdiagnosis – 42%
  - Lack of continuity of care – 39%
- Facility
  - Inadequate knowledge: 34%
  - Coordination of care: 22%
  - Inadequate services: 15%
- Patient
  - Underlying medical condition: 39%
  - Delays in seeking care: 42%
  - Lack of knowledge regarding symptom or condition severity: 39%

Main EK et al, Obstet Gynecol, 2015

TABLE 2

**Severe maternal morbidity in women with and without severe hypertension**

	Severe HTN (n = 2252)		No severe HTN (n = 93,650)		P value
	n	%	n	%	
Severe maternal morbidities					
Total SMM (from Callaghan criteria)	197	8.8	2178	2.3	<.001
Pulmonary edema	9	0.4	15	0.02	<.001
Acute respiratory distress syndrome	19	0.84	51	0.05	<.001
Stroke	2	0.09	17	0.02	.07
Transfusion	116	5.2	1096	1.2	<.001
Ventilation	14	0.6	47	0.05	<.001
Non—Callaghan criteria morbidities					
Postpartum hemorrhage <sup>a</sup>	228	10.1	4268	4.6	<.001
Placental abruption <sup>a</sup>	66	2.9	1015	1.1	<.001
Mean length of stay (SD)	5.32 (4.45)		2.76 (2.45)		<.001
Mean gestational age at delivery <sup>b</sup> (SD)	35.6 (3.5)		38.7 (2.1)		<.001

HTN, hypertension; SMM, severe maternal morbidity; SD, standard deviation.

<sup>a</sup> Placental abruption and postpartum hemorrhage calculated independently of Callaghan's metric; <sup>b</sup> Missing in 8%.

Kilpatrick et al. Severe maternal morbidity and intrapartum severe hypertension. *Am J Obstet Gynecol* 2016.

**TABLE 3**  
**Antihypertensive treatment and severe maternal morbidity rates by increasing blood pressure severity in severely hypertensive women**

	Categories of severe systolic blood pressure				Categories of Severe Diastolic Blood Pressure			
	Mildly severe (160–172) <sup>a</sup>	Moderately severe (173–192) <sup>a</sup>	Very severe (193–260) <sup>a</sup>	Pvalue	Mildly severe (105–112) <sup>a</sup>	Moderately severe (113–122) <sup>a</sup>	Very severe (123–167) <sup>a</sup>	Pvalue
Treatment status <sup>b</sup>	n = 1000 n (%)	n = 865 n (%)	n = 202 n (%)		n = 564 n (%)	n = 246 n (%)	n = 83 n (%)	
Treated	790 (79.0)	741 (85.7)	184 (91.1)	<.001	464 (82.3)	220 (89.1)	72 (86.8)	.04
Severe maternal morbidity	n = 1037 n (%)	n = 881 n (%)	n = 204 n (%)		n = 577 n (%)	n = 250 n (%)	n = 83 n (%)	
SMM	91 (8.8)	74 (8.4)	19 (9.3)	.90	47 (8.2)	25 (10.0)	10 (12.1)	.42

SMM, severe maternal morbidity.

<sup>a</sup> All blood pressure values are reported in mm Hg. Blood pressure category cut-points were based on examination of the systolic and diastolic blood pressure values by histogram; <sup>b</sup> Excludes 59 women whose blood pressure stabilized before treatment.

Kilpatrick et al. Severe maternal morbidity and intrapartum severe hypertension. *Am J Obstet Gynecol* 2016.

TABLE 1

# Demographic characteristics of women with and without severe hypertension (continued)

	Severe HTN (n = 2252)		No severe HTN (n = 93,650)		Pvalue
	n	%	n	%	
Annual birth volume					
Low (1100–2700)	425	18.9	25,886	27.6	<0.001
Medium (2701–5800)	1452	64.5	50,545	54.0	
High (5801–7000)	375	16.7	17,219	18.4	

AAP NICU, American Association of Pediatrics Neonatal Intensive Care Unit; BMI, body mass index; HTN, hypertension.

<sup>a</sup> Missing in 8%; <sup>b</sup> Missing in 17%; <sup>c</sup> American Association of Pediatrics. Levels of Neonatal Care. Pediatrics 2012; 130; 587.

Kilpatrick et al. Severe maternal morbidity and intrapartum severe hypertension. Am J Obstet Gynecol 2016.

**TABLE 4****Antihypertensive treatment rates and severe maternal morbidity by hospital characteristics in severely hypertensive women**

	AAP NICU level		<i>P</i> value	Annual birth volume		<i>P</i> value
	Level III <sup>a</sup>	Level IV <sup>a</sup>		<2500	≥2500	
Treatment status <sup>b</sup>	n = 1372 n (%)	n = 821 n (%)		n = 320 n (%)	n = 1873 n (%)	
Treatment rate	1100 (80.2%)	704 (85.8%)	<.001	221 (69.1%)	1583 (84.5%)	<.001
Severe maternal morbidity	n = 1412 n (%)	n = 840 n (%)		n = 330 n (%)	n = 1922 n (%)	
SMM rate	149 (10.6%)	48 (5.7%)	<.001	51 (15.5%)	146 (7.6%)	<.001

AAP NICU, American Academy of Pediatrics Neonatal Intensive Care Unit; SMM, severe maternal morbidity.

<sup>a</sup> From 15 [superscript]; <sup>b</sup> Excludes 59 women who were not treated because their blood pressure stabilized before treatment.

Kilpatrick et al. Severe maternal morbidity and intrapartum severe hypertension. *Am J Obstet Gynecol* 2016.

# Medication selection for intrapartum hypertension

- Previous analyses suggest no difference in therapeutic effectiveness for oral compared with intravenous administration
  - IV hydrazine - 68%
  - IV labetalol - 71%
  - PO nifedipine - 82%
- 17% of patients were not treated

Kilpatrick SJ, Abreo A, Greene N, et al. Am J Obstet Gynecol 2016;214:1.e1-1.e7.

# But can I bring them too low and too fast?

**Risks of parenteral antihypertensive therapy for the treatment of severe maternal hypertension are low.**

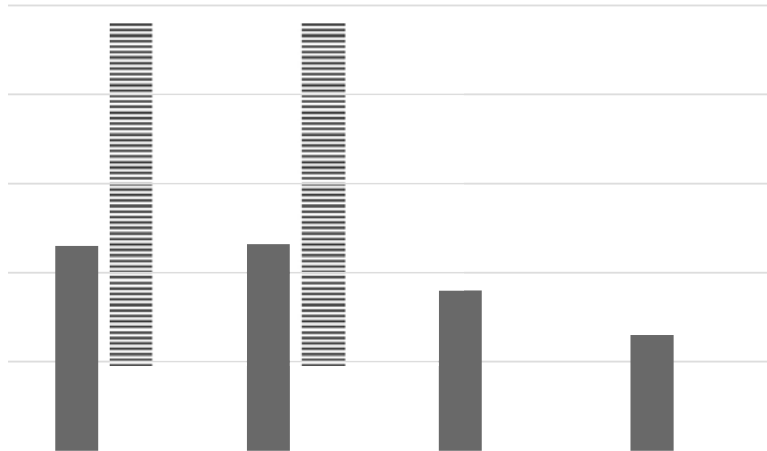
- 69 women received hydralazine
- 31 women received labetalol
- Incidence of hypotension ( $\geq 30\%$  reduction in SBP) was similar between the labetalol (10%) and hydralazine (11%) groups ( $p = 0.98$ ).
- No women experienced post-treatment SBP  $< 90$  mmHg.
- No association was observed between fetal heart rate category change and drug used. No women required emergent delivery for fetal indications.

Sharma KJ, Rodriguez M, Kilpatrick SJ, et al. Hypertens Pregnancy 2016;35(1):123-8

# Co-administration of Magnesium

FIGURE

Rate of eclampsia and severe maternal morbidity

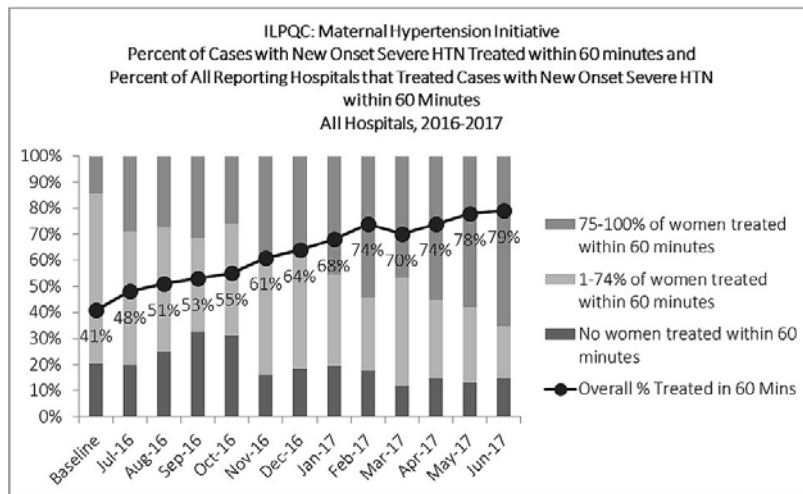


# ILPQC Maternal Hypertension Initiative

- Illinois participated in a statewide quality improvement initiative involving maternal hypertension via the Illinois Perinatal Quality Collaborative (ILPQC)
- Aim: reduce the rate of severe morbidities in women with severe preeclampsia, eclampsia, preeclampsia superimposed on pre-existing hypertension by 20% by December 2017
- Approach involved
  - Identification of hospital teams (5/2016)
  - Implementation of evidence-based practices/protocols/and the Alliance for Innovation on Maternal Health (AIM) hypertension bundles (6/2016 – 12/2017)

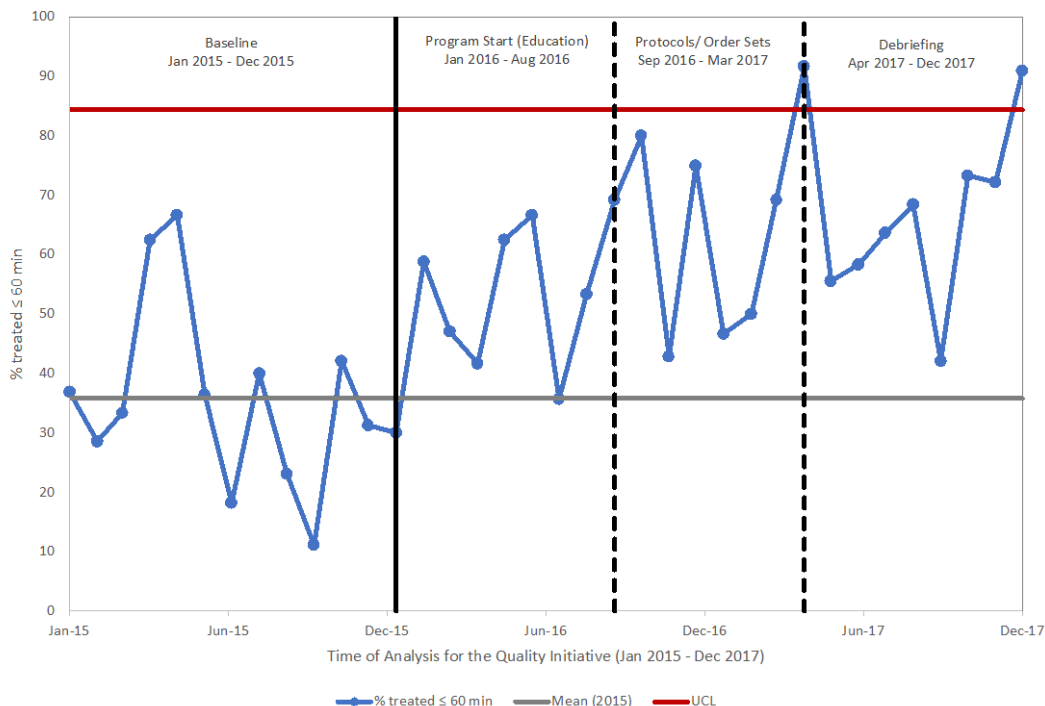
# ILPQC Maternal Hypertension Initiative (2015–2017)

- Presented at Society for Maternal-Fetal Medicine Annual Meeting 2018
- Improvements to timely delivery of therapy from 43% baseline to 79% by Jun 2017
- In addition, there was a 40% reduction in severe maternal morbidity



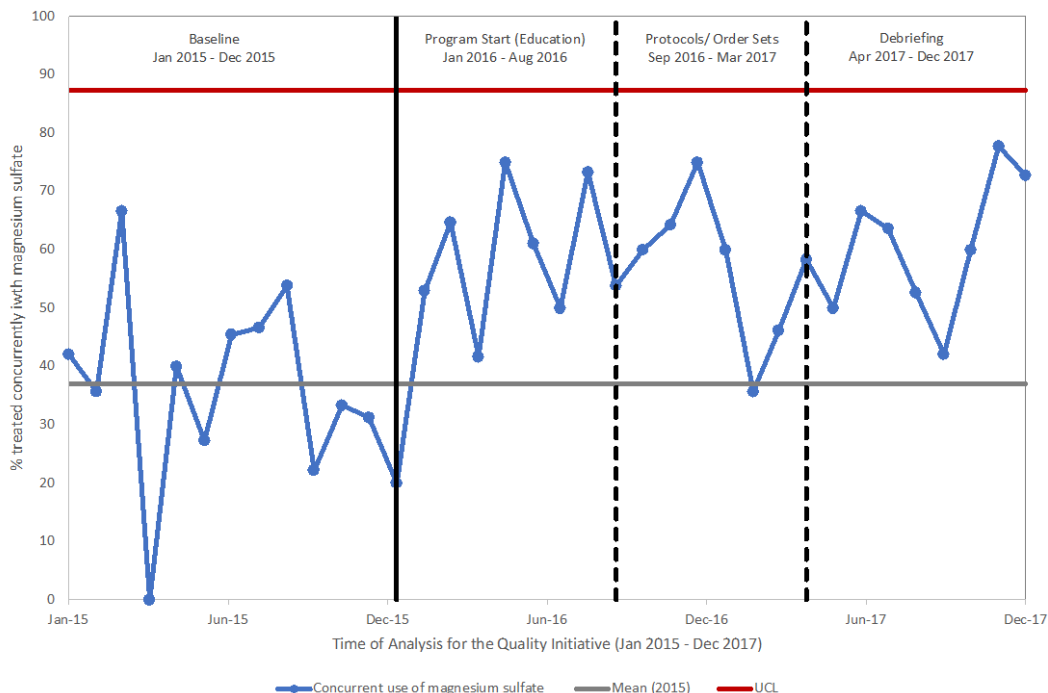
# NorthShore University HealthSystem – Evanston Hospital QI Experience

Figure 3 - Percent of patients treated with appropriate antihypertensive therapy within 60 minutes of severe maternal hypertension ( $\geq 160/110$ ) episode



# NorthShore University HealthSystem – Evanston Hospital QI Experience

Figure 7 - Percent of patients treated concurrently with magnesium sulfate following severe maternal hypertension ( $\geq 160/110$ ) episode



# National Partnership for Maternal Safety

## Consensus Bundle on Severe Hypertension During Pregnancy and the Postpartum Period

1. Standard Diagnostic Criteria and Monitoring and Treatment for Severe Preeclampsia or Eclampsia
2. Unit Team Education, Reinforced by Regular Unit-Based Drills With Debriefs
3. Process for Timely Triage of Women With Hypertension During Pregnancy and the Postpartum Period, Including the Emergency Department and Outpatient Areas
4. Rapid Access to Medications Used for Severe Hypertension or Eclampsia
5. System Plan for Escalation, Obtaining Appropriate Consultation, and Maternal Transport, as Needed
6. Standard Protocol for Measurement and Assessment of Blood Pressure and Urine Protein for All Women During Pregnancy and the Postpartum Period
7. Standard Response to Maternal Early Warning Signs
8. Facility-Wide Standards for Educating Women on Signs and Symptoms of Hypertension and Preeclampsia Prenatally and Postpartum
9. Facility-Wide Standard Protocols With Checklists and Escalation Policies for Management and Treatment
10. Minimum Requirements for Protocol
11. Support Plan for Patients, Families, and Staff for Intensive Care Unit Admissions and Serious Complications of Severe Hypertension
12. Establish a Culture of Huddles for High-Risk Patients and Postevent Team Debrief
13. Multidisciplinary Review of All Severe Hypertension or Eclampsia Patients Admitted to an Intensive Care Unit for Systems Issues
14. Monitor Outcomes and Process Metrics

# OSUWMC Experience with Hypertension QI

## Initial Occurrence

Distinct Encounter  
with Consecutive  
Severe BP

1487

Distinct Patient with  
Consecutive  
Severe BP

1391

Treated within 60 min  
After 1st Severe BP

40.5%

Treated within 60 min  
After 1st Consecutive  
Severe BP

62.3%

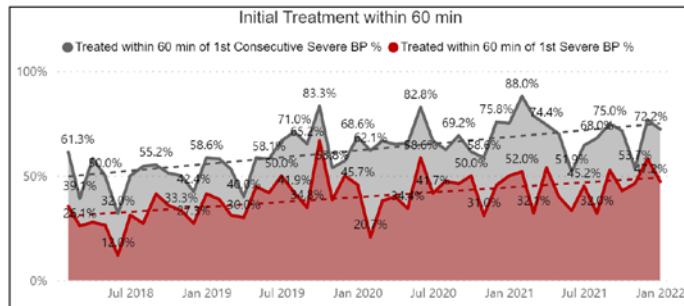
Patient Level Report - BP Reading

Discharge Date

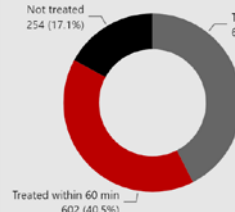
Last 48 Months (Calendar)

Patient Level Report - BP Reading Unit

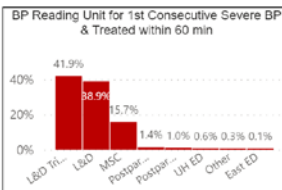
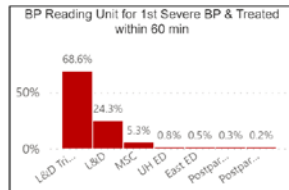
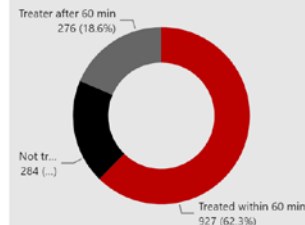
2/1/2018 - 1/31/2022



Medication Administration Timing after 1st Severe BP



Medication Administration Timing after 1st Consecutive Severe BP



Admitting Unit	Count of PAT_ENC_CSN_ID	Discharging Unit	Count of PAT_ENC_CSN_ID
K6AC	1152	K7W	817
K6N	286	R7W	487
K6W	17	K6W	154
REM	17	K6N	5
<b>Total</b>	<b>1487</b>	<b>Total</b>	<b>1487</b>

Avg. # of Severe BP Reading	23	Severe BP continued after consecutive BP - Avg. # of Instance	3
Avg. # of Total BP Reading	137	Normalized BP after Consecutive BP - Avg. # of Instance	2

## Initiative Goals

- Reduce time to treatment of severe range blood pressure > 160/110
- Provide patient education and appropriate discharge follow-up
- Implementation of evidence-based protocols
- Address disparities in care where possible

# Goals for the project

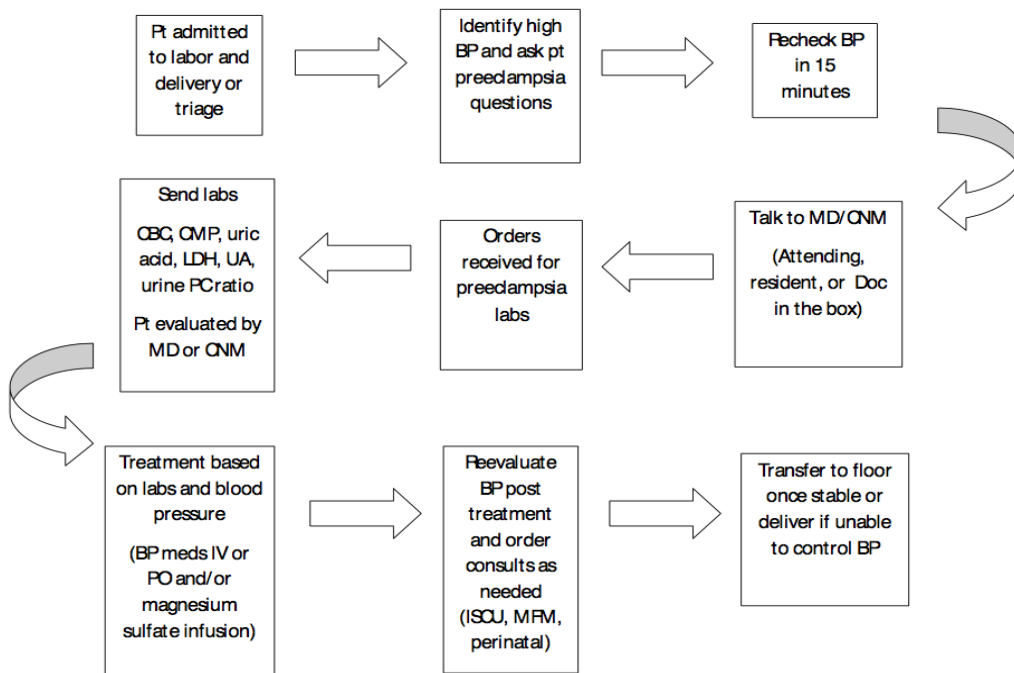
- Reduction of severe maternal morbidity
- Appropriate medical management in under 60 minutes
- Debriefs on all new onset severe HTN cases
- Discharge education and follow-up within 7-10 days for all women with severe range HTN
  - 72 hours with all women with severe range HTN during admission and discharged on medications

## Where to start?

- Staff education and standardized BP measurement
- Rapid access to medications
- IV treatment of SBPs  $> 160$  or  $> 110$  (105) within 30-60 min
- Uniform policy for magnesium sulfate
- Early postpartum follow-up
- Standardized postpartum educational materials
- Reporting and review mechanisms

# Process flow

## HTN Algorithm Labor and Delivery



# Response

- With recognition of hypertensive emergency, treatment should be initiated as soon as possible
- Goal for within 60 minutes
  - Should be seen as upper limit
  - Should strive for sooner if possible

# Antihypertensive agents

Table 3. Antihypertensive Agents Used for Urgent Blood Pressure Control in Pregnancy

Drug	Dosage	Comments	Onset of Action
Labetalol	10–20 mg IV, then 20–80 mg every 10–30 minutes to a maximum cumulative dosage of 300 mg; or constant infusion 1–2 mg/min IV	Tachycardia is less common and fewer adverse effects than other agents.  Avoid in women with asthma, preexisting myocardial disease, decompensated cardiac function, and heart block and bradycardia.	1–2 minutes
Hydralazine	5 mg IV or IM, then 5–10 mg IV every 20–40 minutes to a maximum cumulative dosage of 20 mg; or constant infusion of 0.5–10 mg/hr	Higher or frequent dosage associated with maternal hypotension, headaches, and abnormal fetal heart rate tracings; may be more common than other agents.	10–20 minutes
Nifedipine (immediate release)	10–20 mg orally, repeat in 20 minutes if needed; then 10–20 mg every 2–6 hours; maximum daily dose is 180 mg	May observe reflex tachycardia and headaches.	5–10 minutes

Abbreviations: IM, intramuscularly; IV, intravenously.

- Magnesium is not an antihypertensive
  - But should be administered for cases of severely elevated blood pressure to reduce the risk of severe morbidity and mortality

Practice Bulletin 203 – Chronic Hypertension in Pregnancy  
Shields LE et al, Am J Obstet Gynecol, 2017

#### Box 4. Sample Order Set for Severe Intrapartum or Postpartum Hypertension Initial First-line Management With Immediate-Release Oral Nifedipine\*†

- c Notify physician if systolic blood pressure (BP) is greater than or equal to 160 mm Hg or if diastolic BP is greater than or equal to 110 mm Hg.
- c Institute fetal surveillance if undelivered and fetus is viable.
- c If severe BP elevations persist for 15 minutes or more, administer immediate-release nifedipine capsules (10 mg orally).‡
- c Repeat BP measurement in 20 minutes and record results.
- c If either BP threshold is still exceeded, administer immediate-release nifedipine capsules (20 mg orally). If BP is below threshold, continue to monitor BP closely.
- c Repeat BP measurement in 20 minutes and record results.
- c If either BP threshold is still exceeded, administer nifedipine immediate release capsule (20 mg orally). If BP is below threshold, continue to monitor BP closely.
- c Repeat BP measurement in 20 minutes and record results.
- c If either BP threshold is still exceeded, administer labetalol (20 mg intravenously for more than 2 minutes) and obtain emergency consultation from maternal–fetal medicine, internal medicine, anesthesia, or critical care subspecialists.
- c Give additional antihypertensive medication per specific order.
- c Once the aforementioned BP thresholds are achieved, repeat BP measurement every 10 minutes for 1 hour, then every 15 minutes for 1 hour, then every 30 minutes for 1 hour, and then every hour for 4 hours.
- c Institute additional BP timing per specific order.

### Box 5. Sample Order Set for Severe Intrapartum or Postpartum Hypertension Initial First-line Management With Hydralazine\*

- c. Notify physician if systolic BP is 160 mm Hg or more or if diastolic BP is 110 mm Hg or more.
- c. Institute fetal surveillance if undelivered and fetus is viable.
- c. If severe BP elevations persist for 15 minutes or more, administer hydralazine (5 mg or 10 mg IV for more than 2 minutes).
- c. Repeat BP measurement in 20 minutes and record results.
- c. If either BP threshold is still exceeded, administer hydralazine (10 mg IV for more than 2 minutes). If BP is below threshold, continue to monitor BP closely.
- c. Repeat BP measurement in 20 minutes and record results.
- c. If either BP threshold is still exceeded, administer labetalol (20 mg IV for more than 2 minutes). If BP is below threshold, continue to monitor BP closely.
- c. Repeat BP measurement in 10 minutes and record results.
- c. If either BP threshold is still exceeded, administer labetalol (40 mg IV for more than 2 minutes) and obtain emergency consultation from maternal–fetal medicine, internal medicine, anesthesia, or critical care subspecialists.
- c. Give additional antihypertensive medication per specific order.
- c. Once the aforementioned BP thresholds are achieved, repeat BP measurement every 10 minutes for 1 hour, then every 15 minutes for 1 hour, then every 30 minutes for 1 hour, and then every hour for 4 hours.
- c. Institute additional BP timing per specific order.

## Box 6. Sample Order Set for Severe Intrapartum or Postpartum Hypertension, Initial First-line Management With Labetalol\*

- c Notify physician if systolic BP measurement 160 mm Hg or more or if diastolic BP measurement is 110 mm Hg or more.
- c Institute fetal surveillance if undelivered and fetus is viable.
- c If severe BP elevations persist for 15 minutes or more, administer labetalol (20 mg IV for more than 2 minutes).
- c Repeat BP measurement in 10 minutes and record results.
- c If either BP threshold is still exceeded, administer labetalol (40 mg IV for more than 2 minutes). If BP is below threshold, continue to monitor BP closely.
- c Repeat BP measurement in 10 minutes and record results.
- c If either BP threshold is still exceeded, administer labetalol (80 mg IV for more than 2 minutes). If BP is below threshold, continue to monitor BP closely.
- c Repeat BP measurement in 10 minutes and record results.
- c If either BP threshold is still exceeded, administer hydralazine (10 mg IV for more than 2 minutes). If BP is below threshold, continue to monitor BP closely.
- c Repeat BP measurement in 20 minutes and record results.
- c If either BP threshold is still exceeded, obtain emergency consultation from maternal–fetal medicine, internal medicine, anesthesia, or critical care subspecialists.
- c Give additional antihypertensive medication per specific order.
- c Once the aforementioned BP thresholds are achieved, repeat BP measurement every 10 minutes for 1 hour, then every 15 minutes for 1 hour, then every 30 minutes for 1 hour, and then every hour for 4 hours.
- c Institute additional BP timing per specific order.

# Escalation

- If need to escalate beyond immediate-release nifedipine labetalol or hydralazine, should involve other specialty teams
- At least one of the following:
  - MFM
  - Internal Medicine
  - Anesthesiology
  - Critical Care
- Consideration for appropriate level of maternity care should be considered as well

# Severe Maternal Morbidity

- Defined as:
  - ICU transfer
  - Hemorrhage requiring > 4 units pRBCs
  - Intracranial hemorrhage or ischemic event
  - Pulmonary edema
  - Liver or renal failure
  - Placental abruption
  - Severe feature of preeclampsia (HELLP, oliguria)
  - Ventilation
  - Disseminated intravascular coagulation

# Discharge and follow-up

- Discharge instructions
  - Should include review of warning signs and symptoms for severe manifestations of hypertension in pregnancy
- When planning discharge for hypertensive patient
  - Within 3-7 days if discharged without medication
  - < 72 hours if discharged with medication



## Preeclampsia (High Blood Pressure during Pregnancy)

### WHAT IS PREECLAMPSIA (Pre-e-KLAMP-see-uh)?

**High blood pressure can cause problems for you and your unborn baby.** It can result in a low birth weight baby, premature delivery of the baby or other more serious problems. High blood pressure can also occur up to six weeks after you have given birth. Uncontrolled blood pressure can be life-threatening so it is also important for you to know the signs and symptoms of preeclampsia (high blood pressure).

### WHAT ARE THE SIGNS AND SYMPTOMS OF PREECLAMPSIA?

**The first sign of preeclampsia is usually high blood pressure.** High blood pressure is defined as a blood pressure of either **140** (or higher) top number or **90** (or higher) bottom number. For example: 140/90 ("140 over 90"). **If you have high blood pressure, you may not feel sick** so your healthcare provider will let you know if you have high blood pressure. Along with blood pressure, it is important to watch for other symptoms of preeclampsia so that it can be treated by your doctor and healthcare team quickly and safely.

### THESE SIGNS MAY INCLUDE:

- Headache
- Abdominal or stomach pain
- Right upper side pain or tenderness
- Difficulty seeing, or seeing spots before your eyes
- Nausea or vomiting
- Neck pain
- General feeling of sickness
- Difficulty speaking (unable to form words)
- Difficulty moving arms or legs, or weakness on one side of the body
- Numbness or tingling
- Breathlessness

**SEVERE PREECLAMPSIA IS AN EMERGENCY.** Call your doctor or midwife at once if you are having symptoms. Go to the Emergency Room or call "911" if the symptoms are severe. Treatment must be started as soon as possible. Please keep this important patient information handy.

### CONTACT NUMBER FOR ANY QUESTIONS:

### HOW IS PREECLAMPSIA TREATED? Treatment may include:

- Reduced activity at home with frequent check-ups
- Monitoring you & baby in the hospital
- Delivering the baby
- Medication to control your blood pressure before and after delivery
- Medication to prevent seizures

# Preeclampsia

## What Is It?

Preeclampsia is a serious disease related to high blood pressure. It can happen to any pregnant woman during the second half of her pregnancy.

## Risks to You

- Seizures
- Stroke
- Organ damage
- Death

## Risks to Your Baby

- Premature birth
- Death

## Signs of Preeclampsia



Stomach pain



Headaches



Feeling nauseous;  
throwing up



Seeing spots



Swelling in your  
hands and face



Gaining more than  
5 pounds (2,3 kg)  
in a week

## What Should You Do?

Call your doctor or midwife right away. Finding preeclampsia early is important for you and your baby.

For more information go to [www.preeclampsia.org](http://www.preeclampsia.org)

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## URGENT MATERNAL WARNING SIGNS



Headache that won't go away or gets worse over time



Dizziness or fainting



Thoughts about hurting yourself or your baby



Changes in your vision



Fever



Trouble breathing



Chest pain or fast-beating heart



Severe belly pain that doesn't go away



Severe nausea and throwing up (not like morning sickness)



Baby's movements stopping or slowing



Vaginal bleeding or fluid leaking during pregnancy



Vaginal bleeding or fluid leaking after pregnancy



Swelling, redness, or pain of your leg



Extreme swelling of your hands or face



Overwhelming tiredness

## Pregnant now or within the last year?

Get medical care right away if you experience any of the following symptoms:



Headache that won't go away or gets worse over time



Dizziness or fainting



Changes in your vision



Fever of 100.4°F or higher



Extreme swelling of your hands or face



Thoughts of harming yourself or your baby



Trouble breathing



Chest pain or fast beating heart



Severe nausea and throwing up



Severe belly pain that doesn't go away



Baby's movement stopping or slowing during pregnancy



Severe swelling, redness or pain of your leg or arm



Vaginal bleeding or fluid leaking during pregnancy



Heavy vaginal bleeding or discharge after pregnancy



Overwhelming tiredness

These could be signs of very serious complications. If you can't reach a healthcare provider, go to the emergency room. Be sure to tell them you are pregnant or were pregnant within the last year.

Learn more at [www.cdc.gov/HearHer](http://www.cdc.gov/HearHer)



**HEAR**  
HEAR HER CONCERNING

This list of urgent maternal warning signs was developed by the Council on Patient Safety in Women's Health Care.

# Debrief

- Should occur after the identification, treatment, and resolution of the acute episode
  - When precisely that occurs will depend largely on workplace cultural preferences
- Ideally involves the nursing staff and medical providers together
- Should address what worked, what did not, and potential areas for improvement

# Review

- If not already established, pregnancy and postpartum quality and safety committees can review cases where goals were unmet or severe maternal morbidity encountered to further assess response
- Committees should seek not to punish but rather seek out:
  - Missed opportunities to improve provider and nursing staff performance in subsequent episodes
  - Structural barriers to change that make optimal care challenging

# Considering the Care Needs in the Face of Disparities

- Everyone wants to provide appropriate fair and equitable care
  - In reality gaps still exist
- Many of the issues are structural
  - Health care literacy
  - Access to care
  - Socioeconomic status
- Areas that can be directly controlled
  - Appreciating that an at-risk patient is being cared for and providing extra attention or consideration
  - Language for patients so they can better express concerns

# Considering the Care Needs in the Face of Disparities

- What can the team do further to address barriers?
  - Communication?
    - Example: “Decreased fetal movement” vs “Balling up”
  - Structural barriers?
    - Transportation, additional childcare?
    - Home BP cuffs, telehealth visits
- Be unafraid to address the issue directly
  - Example: “I am concerned that you have an issue with blood pressures that affects black women more severely than others and I want to ensure that we treat you appropriately so that you are not put at risk.”

# Additional Resources

- Alliance for Innovation on Maternal Health (AIM) eModules
  - [https://safehealthcareforeverywoman.org/aim-emodules/#link\\_acc-1-5-d](https://safehealthcareforeverywoman.org/aim-emodules/#link_acc-1-5-d)
- California Maternal Quality Care Collaborative (CMQCC)
  - <https://www.cmqcc.org/qi-initiatives/preeclampsia>
- Illinois Perinatal Quality Collaborative (ILPQC)
  - <http://ilpqc.org/?q=Hypertension>

# Summary

- Severe hypertension in pregnancy and postpartum is an issue that can severely impact expectant and new mothers/families
- It is an issue with identifiable treatment options as well as notable, yet achievable, barriers to timely, safe, and effective care
- Hospital wide quality improvement projects can result in statistical and clinically significant changes in care
- Tools and resources are available to aid hospitals in achieving excellence



# Thank you

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*Questions?*