



CMQCC

CALIFORNIA MATERNAL
QUALITY CARE COLLABORATIVE



CMQCC PREECLAMPSIA TOOLKIT
PREECLAMPSIA CARE GUIDELINES
CDPH-MCAH Approved: 12/20/13

A California Toolkit to Transform Maternity Care

Improving Health Care Response to Preeclampsia:
A California Quality Improvement Toolkit

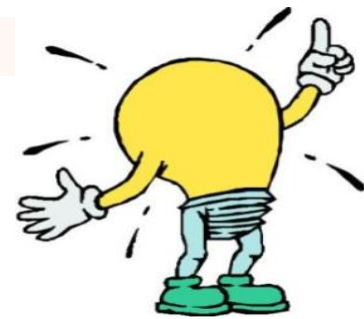
THIS COLLABORATIVE PROJECT WAS DEVELOPED BY:
THE PREECLAMPSIA TASK FORCE

CALIFORNIA MATERNAL QUALITY CARE COLLABORATIVE

MATERNAL, CHILD AND ADOLESCENT HEALTH DIVISION; CENTER FOR FAMILY HEALTH

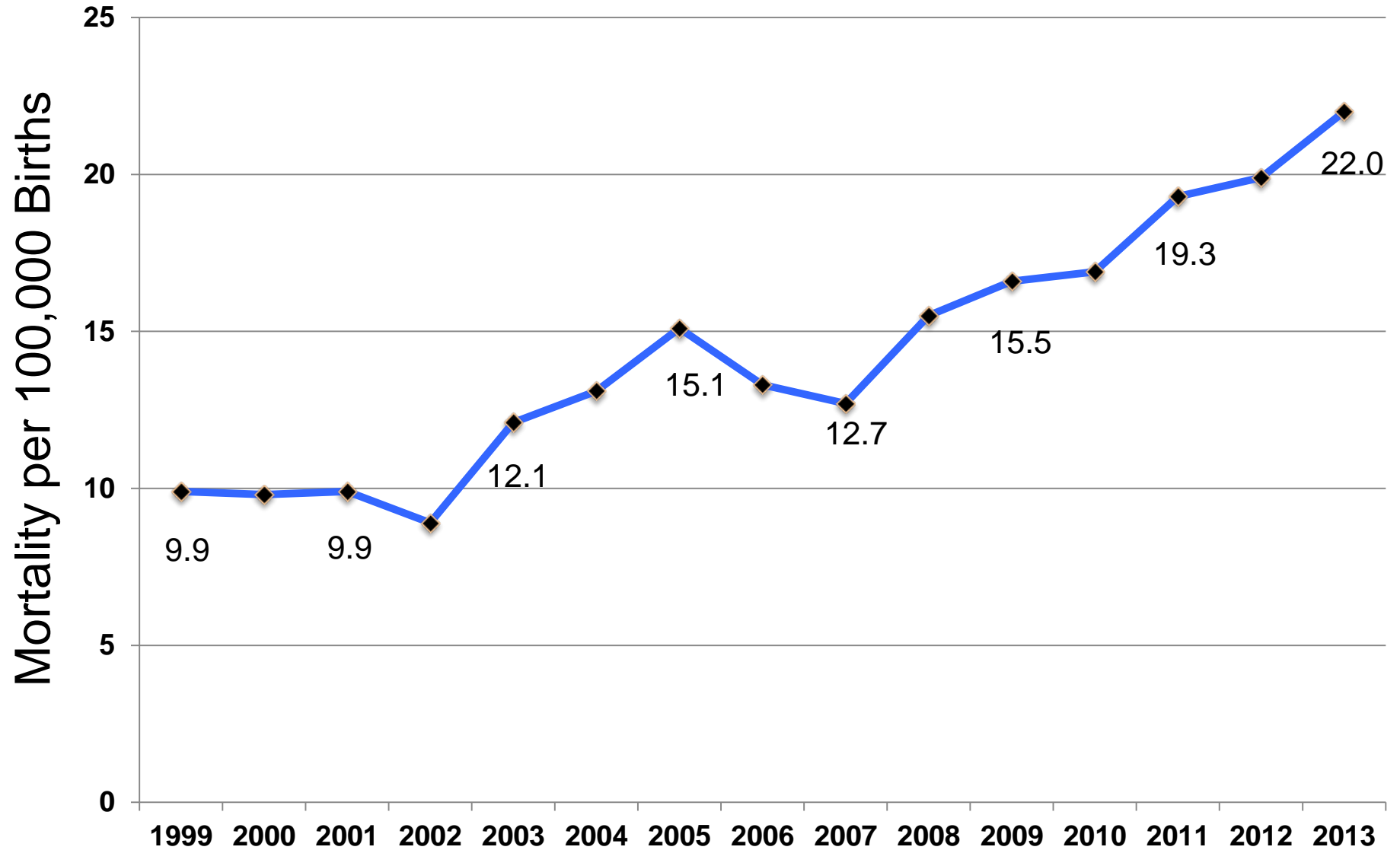
CALIFORNIA DEPARTMENT OF PUBLIC HEALTH

Learning Objectives

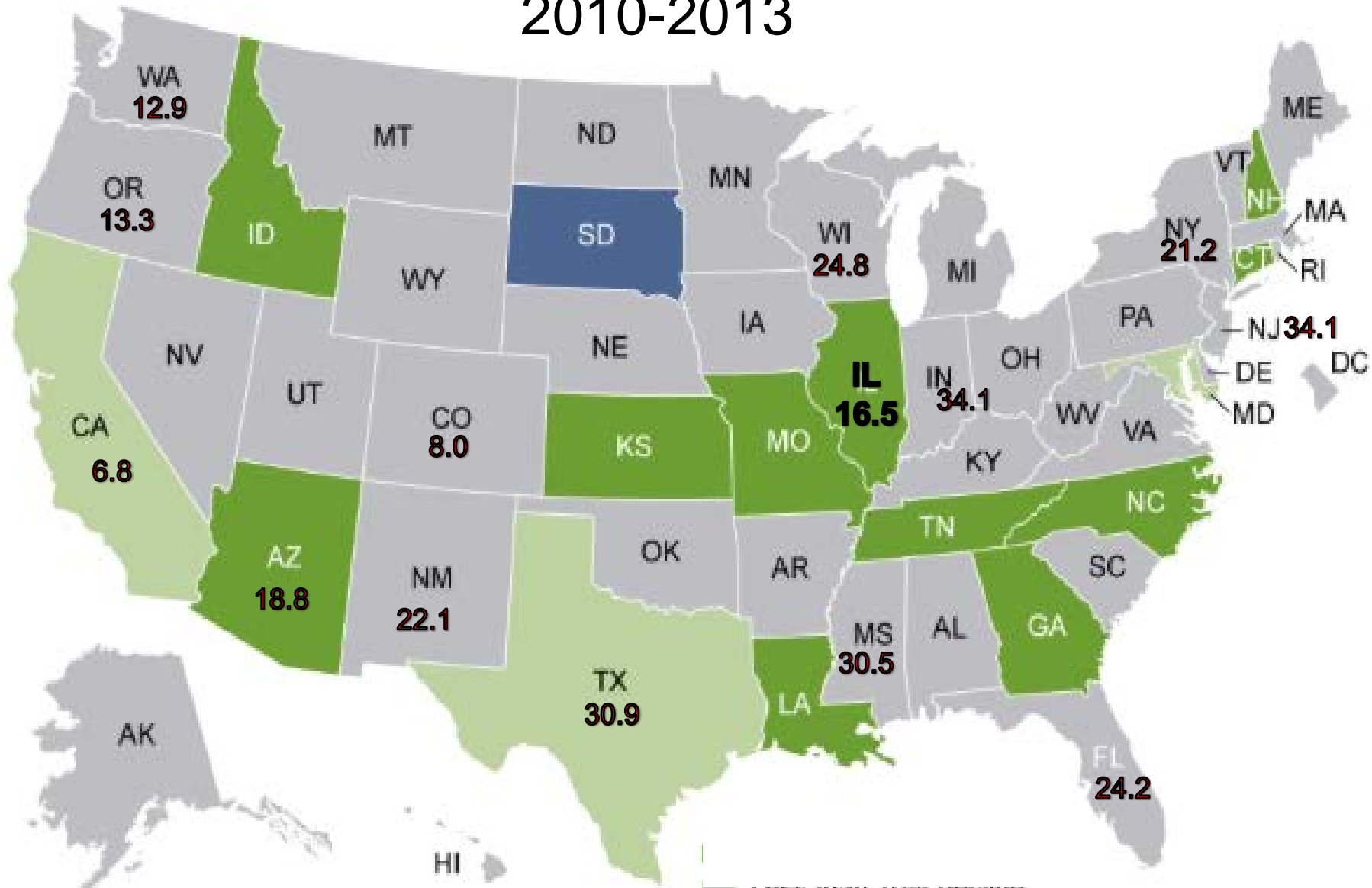


- To review key elements of the CMQCC preeclampsia-hypertensive disorders of pregnancy toolkit.
- Highlight how the use of these recommendations will reduce maternal mortality and morbidity.
- Highlight barriers that Illinois will likely encounter as they move forward with standardizing maternal care in cases of severe BP elevations.

Maternal Mortality USA



Selected Maternal Mortality Rates 2010-2013



Critical Pathways to Poor Outcome



Maternal Death



Near Miss ICU Admission



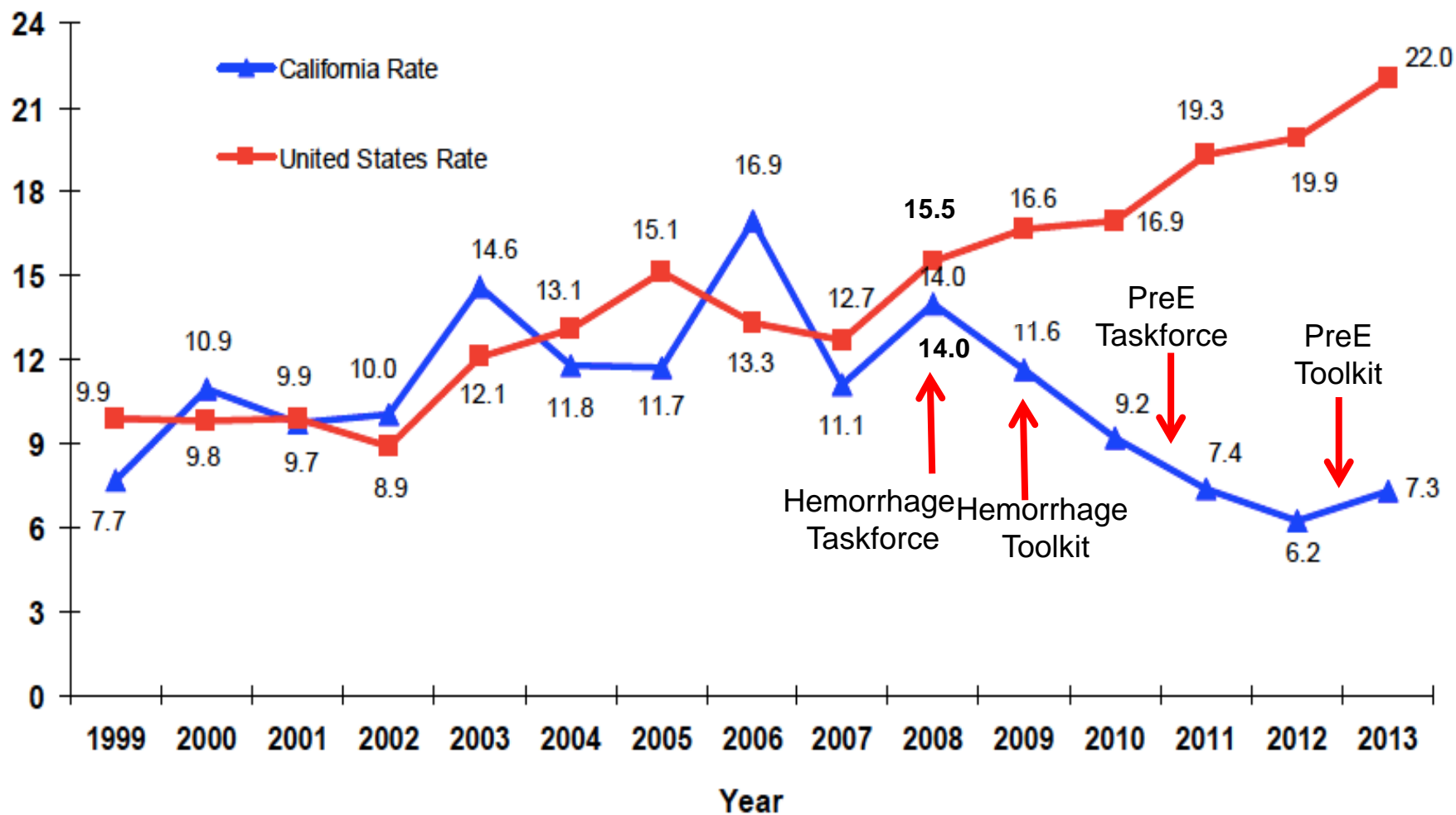
Serious Morbidity



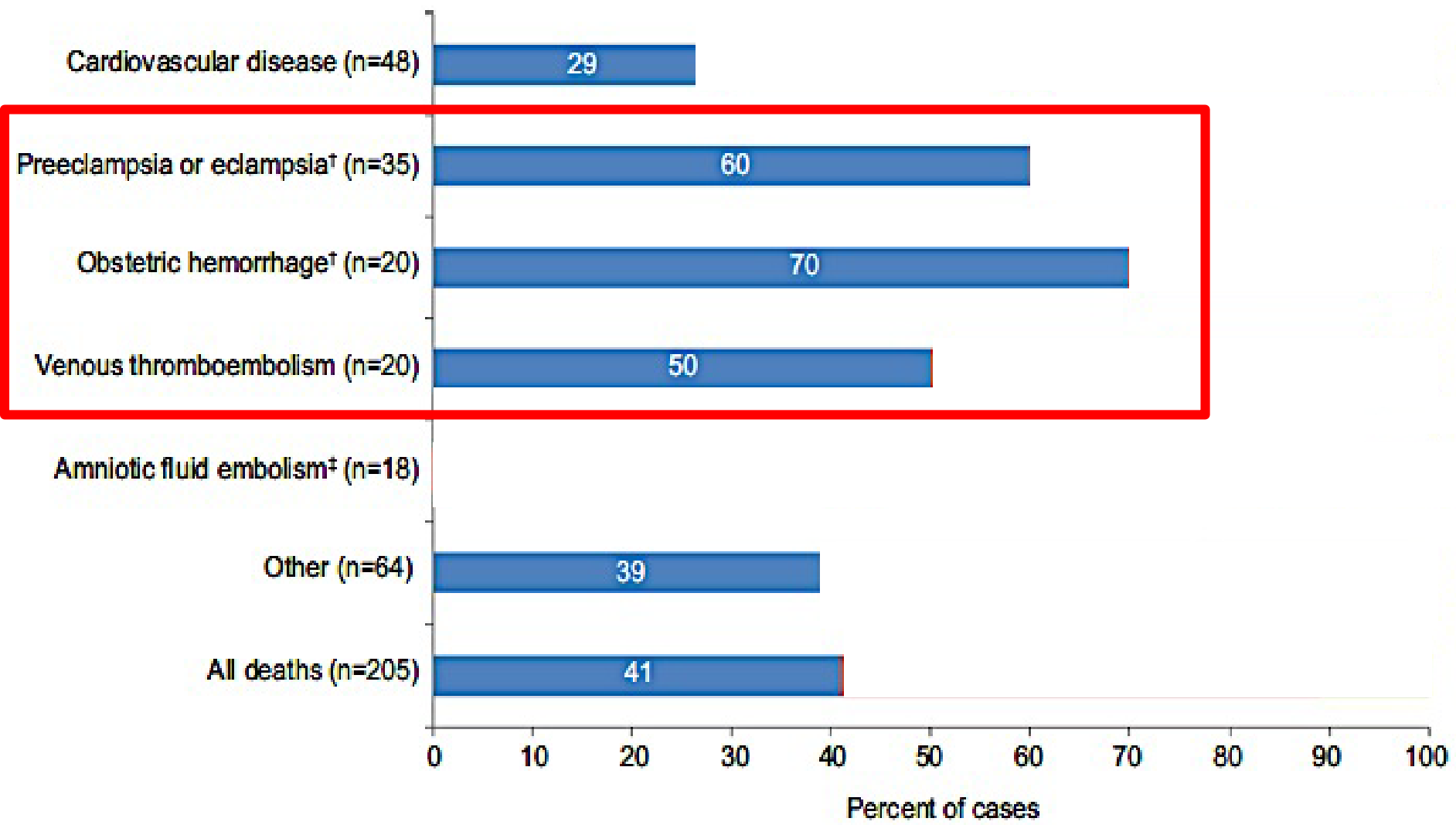
- Clinical Symptoms Recognized
- Delayed Diagnosis
- Delayed Treatment
- Assumption Delivery Fixes Problem
- Discharge without timely Follow-up

Maternal Mortality Rate, California Residents: 1970-2010

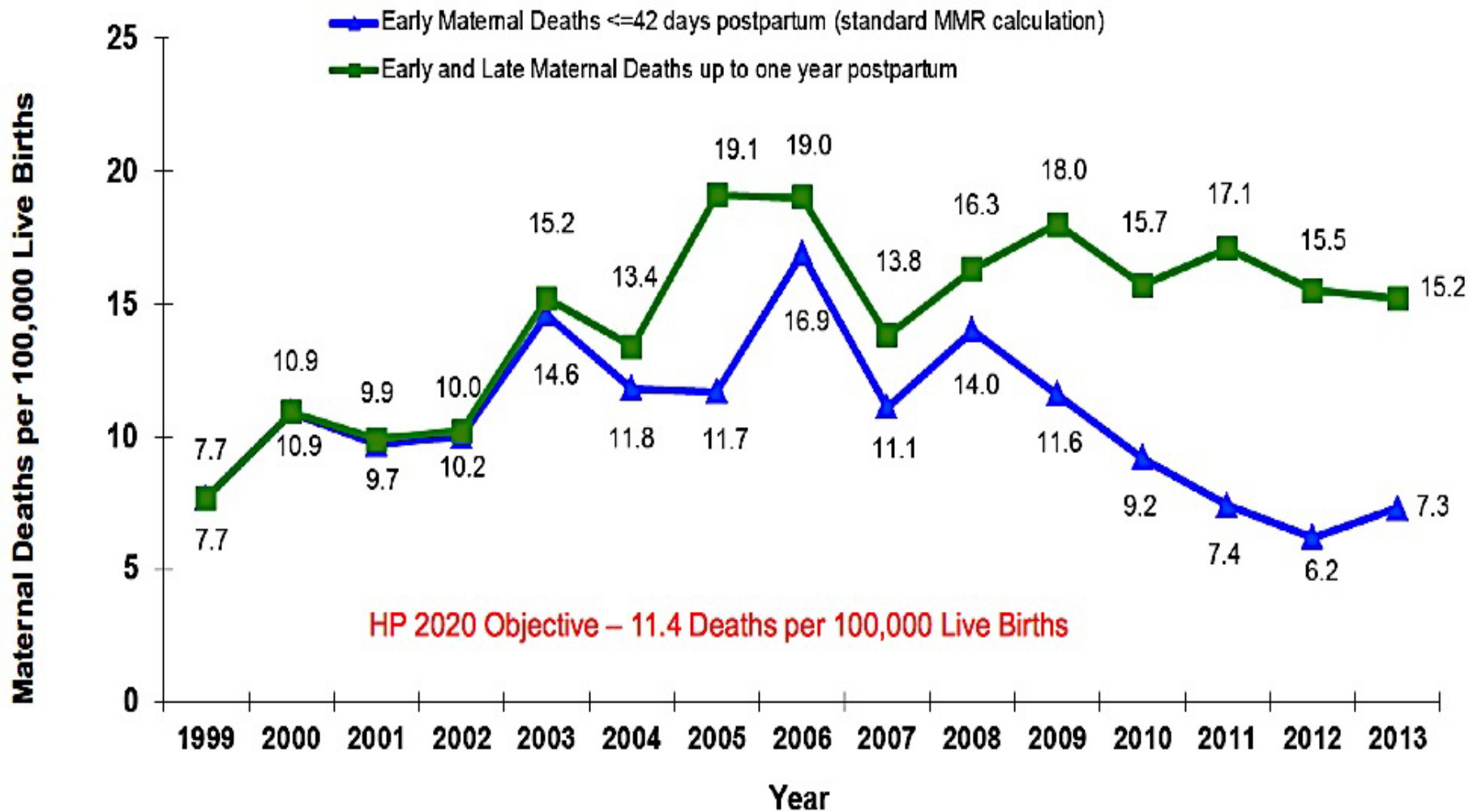
Maternal Deaths per 100,000 Live Births



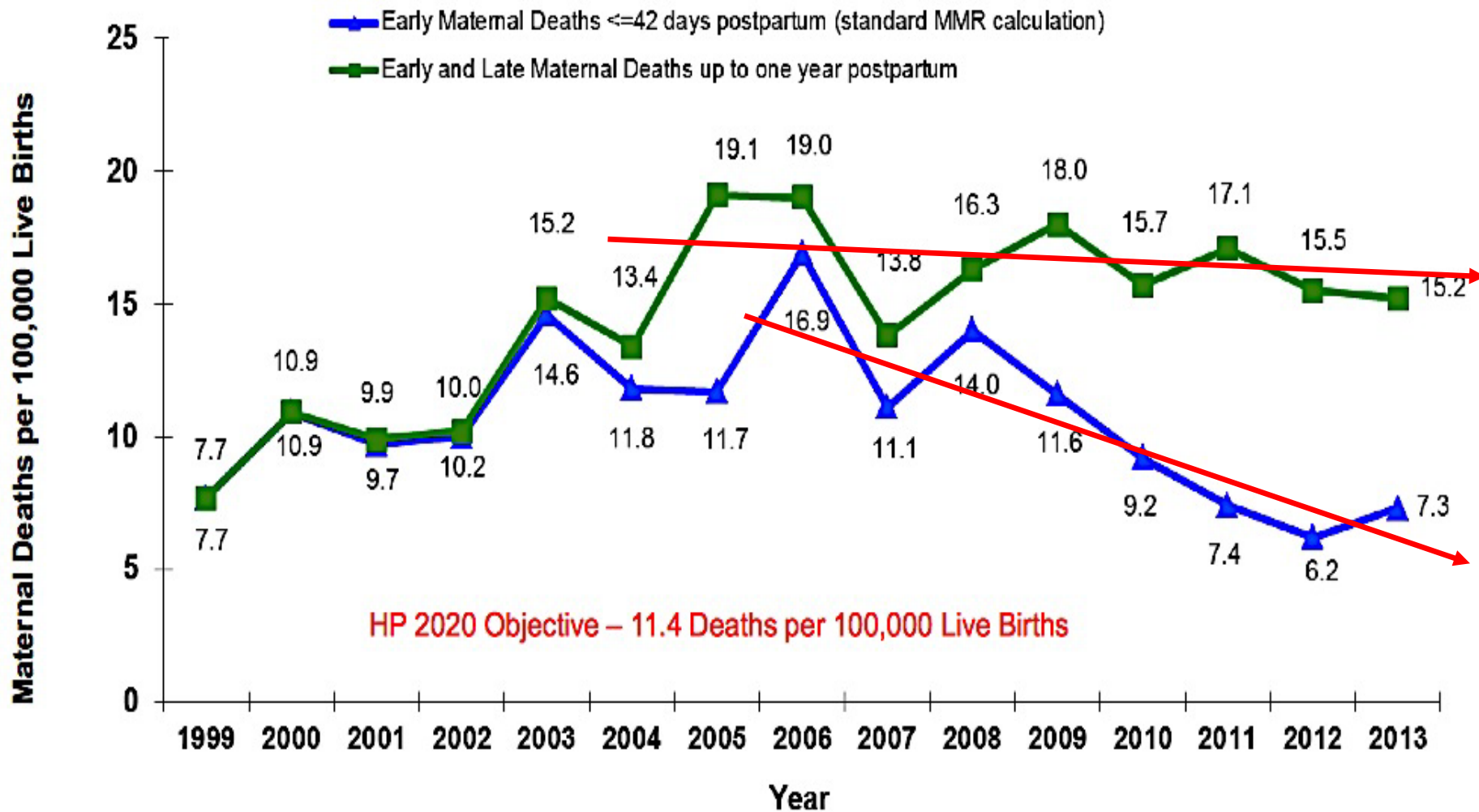
Good To Strong Chance to Alter the Outcome:



CA Maternal Mortality Rate: Early v. Late



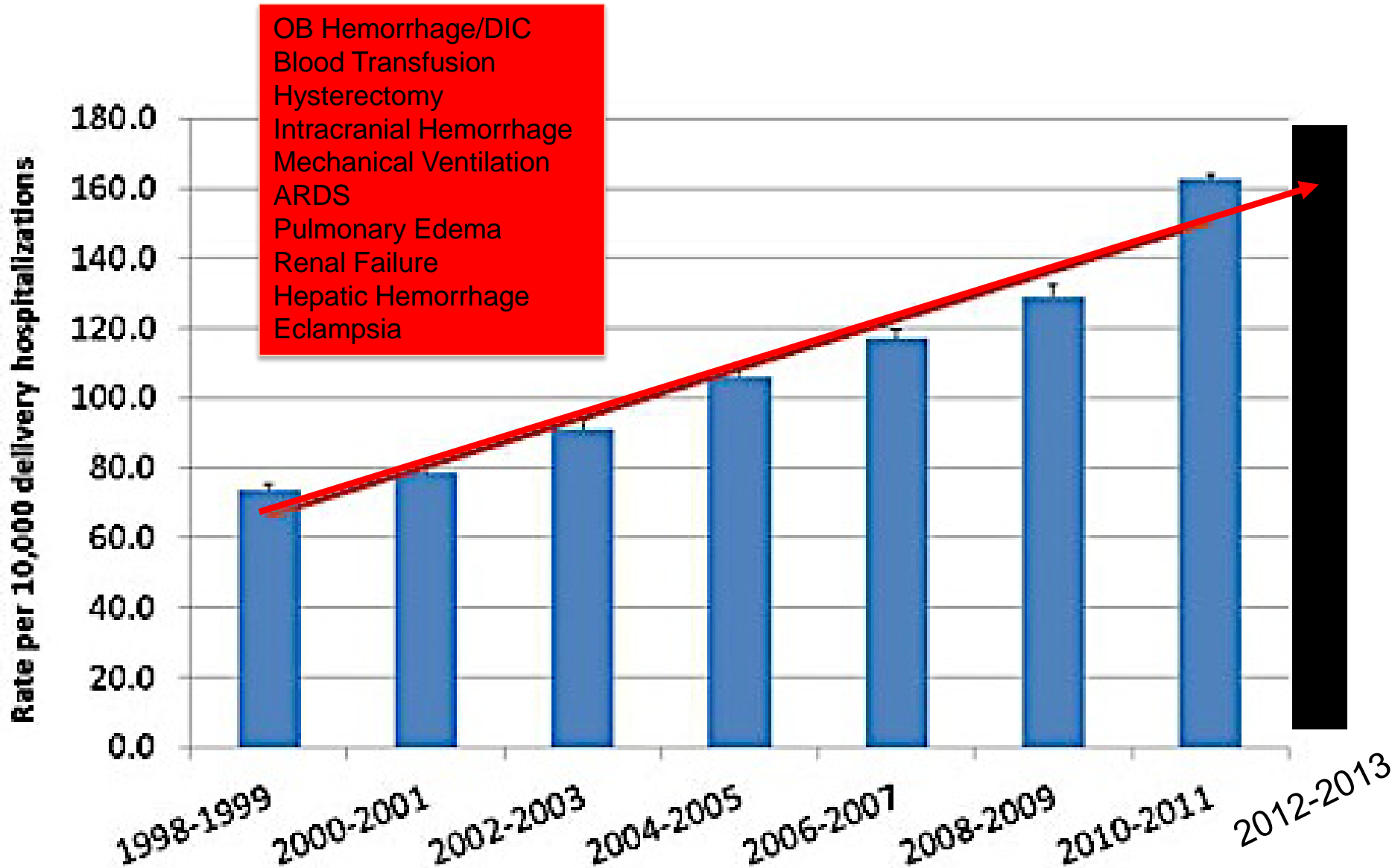
CA Maternal Mortality Rate: Early v. Late



Impact of Hypertension CA-PAMR Cohort 2002-2004

- Cohort of pregnancy-related deaths, N=145
- 17% were “Preeclampsia/Eclampsia”
- ***39% of all pregnancy-related deaths had HTN***

Severe Maternal Morbidity During Delivery Hospitalizations: United States, 1998-2011



Rocket Science?



Brain Surgery?

Classification:

Only 5 things

- 1) GHTN
- 2) PE
- 3) Severe PE
- 4) CHTN
- 5) CHTN+PE



Rocket Science?

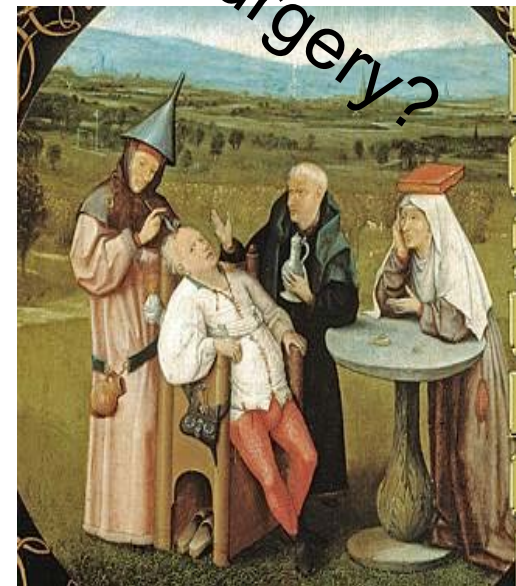


Only 5 things

Management:

- 1) Recognize Symptoms
- 2) BP control
- 3) Seizure prevention
- 4) Delivery- 34 wks, 37wks.
- 5) Postpartum surveillance

Brain Surgery?



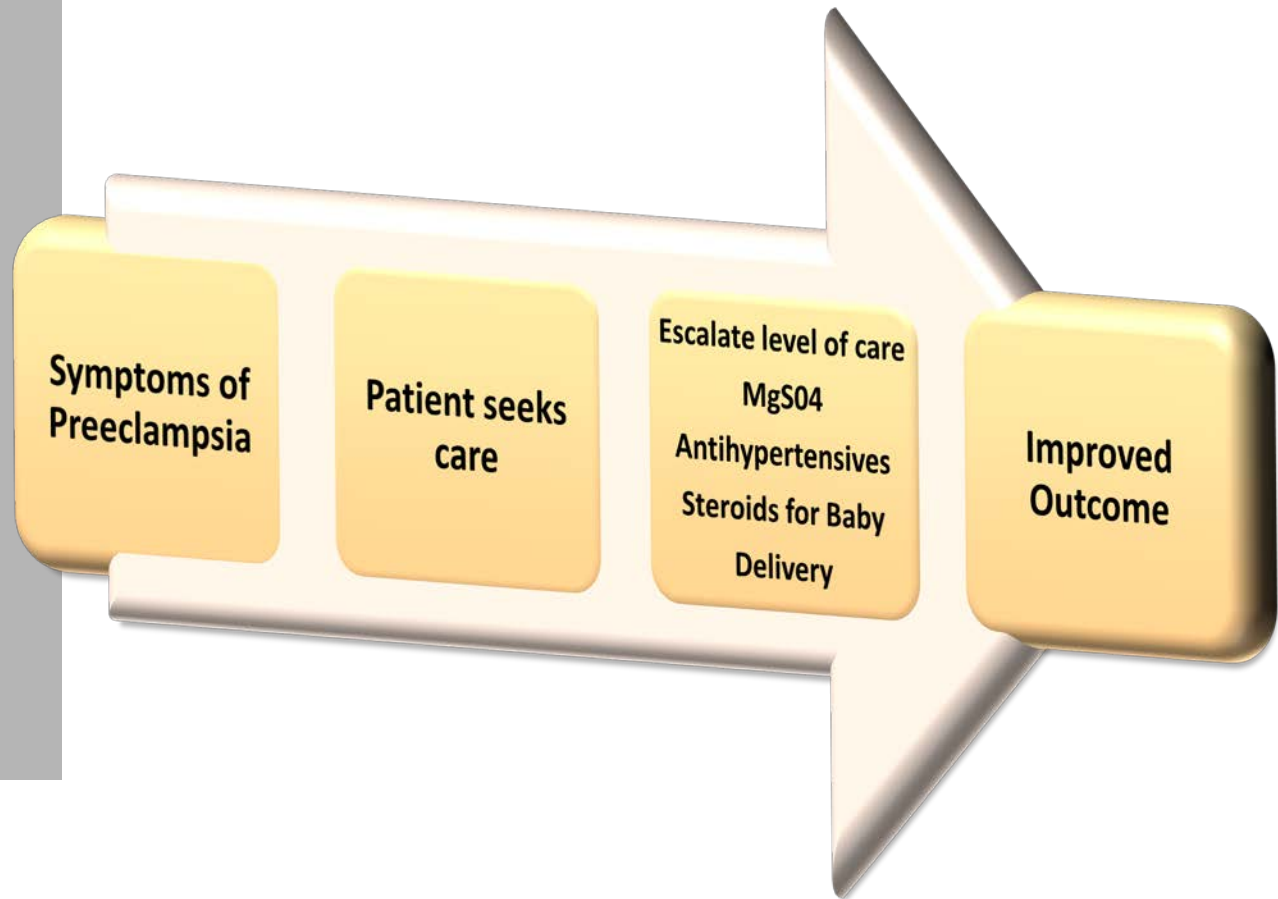
Where are the gaps?

Contributing Factors to Maternal Death	Preeclampsia	TOTAL
<i>HEALTHCARE PROFESSIONALS</i>	96%	79%
Delay in Diagnosis	92% 1.7x	54%
Use of Ineffective Treatment	79% 1.6x	42%
Misdiagnosis	54% 1.7x	31%
HEALTHCARE FACILITY	12 (48%)	72 (50%)

Where are the gaps?

Contributing Factors to Maternal Death	Preeclampsia	TOTAL
<i>PATIENT FACTORS</i>	64%	72%
Delay or Failure to Seek Care	63% 2.4x	26%
Lack of Understanding of the Importance of Health Event	56% 3.7x	15%

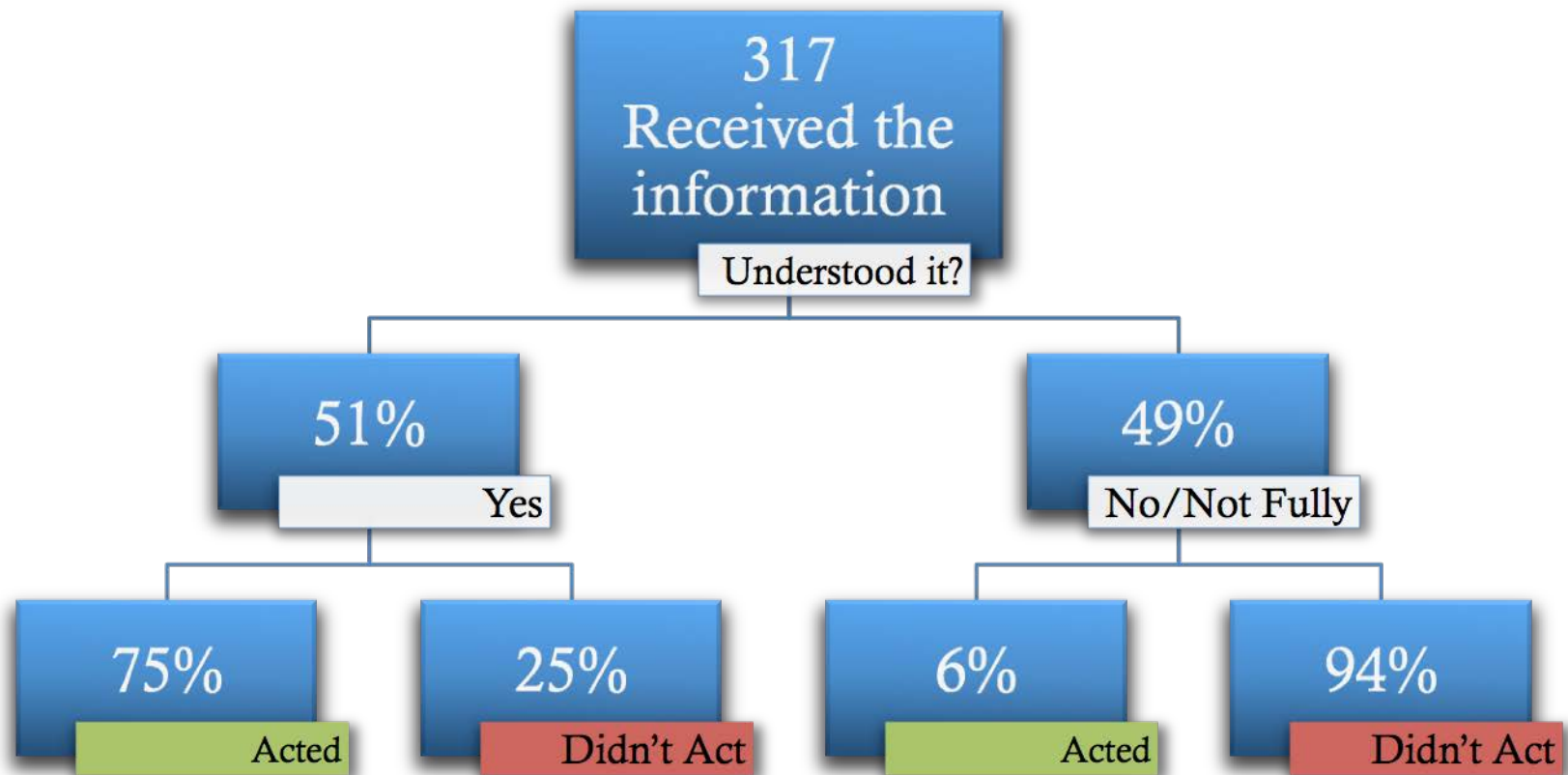
Maternal Recognition Improves Outcomes



“The best way to diagnose preeclampsia is to listen to your patients.”

~ Dr. Baha Sibai

Did Comprehension Lead to Action?



- ***1:5 recalled information and understood it!***
- ***75% v.6% acted if they had symptoms***

What is it?

Why should you care?

What should you pay attention to?

What should you do if you have any of the signs?

Ask Your Doctor or Midwife

Preeclampsia

What Is It?

Preeclampsia is a serious disease related to high blood pressure. It can happen to any pregnant woman.

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 in a week

What Should You Do?

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

For more information go to www.preeclampsia.org

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Preeclampsia Awareness

2014 Survey Results Show:



High overall awareness of preeclampsia among expectant and new mothers*

83% had heard of preeclampsia



Yet despite high overall awareness, there is less knowledge of the symptoms



More than half of respondents did not associate many known symptoms with preeclampsia

Most are also aware that this serious condition related to high blood pressure requires immediate medical evaluation



99% knew preeclampsia is serious, even life-threatening, for mother and baby



88% knew high blood pressure is a sign of preeclampsia



96% would call their doctor or midwife if they experienced symptoms

Other important aspects of preeclampsia are also less known

44% didn't know that preeclampsia can occur up to six weeks after delivery



46% didn't know that women with preeclampsia are at greater risk for future health problems



*Survey conducted among visitors to the BabyCenter website from January 17 to January 20, 2014. Total of 1,591 respondents completed the survey; qualified respondents defined as female U.S. residents, 18 years or older, who are pregnant or have at least one child three years of age or younger.

Key Clinical Pearl

Patients with vague symptoms of:

- headache
- abdominal pain (possibly “referred” pain to neck, shoulder, back)
- shortness of breath
- generalized swelling, extreme weight gain
- complaints of “I just don’t feel right”
- Visual disturbances

Need to be evaluated for atypical presentations of preeclampsia with “severe features”



24 yo G1P0 at 34 weeks

- Presented to hospital at 11pm
- Reports decreased fetal movement and headache
- BP 165/105
- No proteinuria
- Patient to left side
- BP now 155/100
- Reactive NST
- Given vicodin for HA → better
- DC home

24 yo G1P0 at 34 weeks

- Presented to hospital at 11 pm
- Reports decreased fetal movement and headache
- BP 165/105
- No proteinuria → *No preeclampsia*
- Patient to left side → *Inappropriate BP assessment*
- Reactive NST
- BP now 155/100
- Given vicodin for HA → better → *Ignored Sx*
- DC home

24 yo G1P0 at 34.2 weeks

- Presents with HA
- BP 175/105, 2+ protein
- NST NR
- Labs sent: plts=55K, Cr=1.6, AST/ALT=320/150, Fibrinogen=175, INR=1.4
- No BP meds
- Mag started with a seizure mid-dose
- C-section for fetal decels
- Postpartum Hemorrhage with DIC

24 yo G1P0 at 34.2 weeks

- Presents with HA
- BP 175/105, 2+ protein → *Has preeclampsia*
- NST NR
- Labs sent: plts=55K, Cr=1.6, AST/ALT=320/150
- No BP meds → *Diastolic BP <110*
- Mag started with a seizure mid-dose → *Too late*
- C-section for fetal decels
- Postpartum Hemorrhage with DIC → *Preventable*



Historically How Well Do We Treat BP?

Treating if diastolic pressure >110

Treating BP with magnesium

Not treating if there is no proteinuria

Waiting for 6 hours



ACOG **PRACTICE BULLETIN**

CLINICAL MANAGEMENT GUIDELINES FOR
OBSTETRICIAN–GYNECOLOGISTS

NUMBER 33, JANUARY 2002

Reaffirmed 2012

This Practice Bulletin was developed by the ACOG Committee on Practice Bulletins—Obstetrics with the assistance of Larry C. Gilstrap III, MD,

Diagnosis and Management of Preeclampsia and Eclampsia

Summary of Recommendations

The following recommendations are based on good and consistent scientific evidence (Level A):

- ▶ Magnesium sulfate should be used for the prevention and treatment of seizures in women with severe preeclampsia or eclampsia.

growth restriction.

- ▶ Expectant management should be considered for women remote from term who have mild preeclampsia.
- ▶ Antihypertensive therapy (with either hydralazine or labetalol) should be used for treatment of diastolic blood pressure levels of 105–110 mm Hg or higher.

Cause of U.S. Maternal Mortality

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

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

Cause of death	Percent of deaths		
	Preeclampsia	Eclampsia	Total
Cerebrovascular events	17.3	21.4	38.7
Cerebrovascular hemorrhage	15.8	18.8	34.7
Cerebral edema	1.1	1.8	2.9
Cerebral embolus	0.4	0.8	1.1
Renal or hepatic failure	7.2	5.4	12.5
HELLP syndrome	4.8	2.3	7.1
Other complications of hypertension	13.9	11.8	25.7
Not specified hypertension	7.6	8.3	15.9
Preeclampsia and eclampsia	50.8	49.2	100

90%
of CVA were
from
hemorrhage

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

Mackay AP, Berg CJ, Atrash HK. Obstetrics and Gynecology 2001;97:533-538

How Do Women Die of Preeclampsia in CA?

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

→ 17%

Final Cause of Death	Number	%	Rate/100,000
Stroke	16	64%	1.0
<i>Hemorrhagic</i>	14	-87.5%	
<i>Thrombotic</i>	2	-12.5%	
Hepatic (liver) Failure	4	16.0%	.25
Cardiac Failure	2	8.0%	
Hemorrhage/DIC	1	4.0%	
Multi-organ failure	1	4.0%	
ARDS	1	4.0%	

BP Associated Major Morbidity

- Stroke
- Placental Abruptio
- Eclampsia
- Cerebral Edema/PRES
- Retinal Detachment
- Liver Hematoma/Rupture
- Renal Failure
- Hemorrhage/DIC
- Pulmonary Edema
- Ascites/pleural effusion

Blood Pressure Control and Stroke

- 23/24 (**95.8%**) women with **systolic BP \geq 160mm Hg**
- 24/24 (**100%**) had a **BP \geq 155 mm Hg**
- 3/24 (**12.5%**) women with **diastolic BP $>$ 110mm Hg**
- 5/28 (**20.8%**) women with **diastolic BP $>$ 105mm Hg**

Preeclampsia Toolkit BP Treatment Recommendations

Systolic ≥ 160	Diastolic ≥ 110	Repeat BP and Treat Within <u>60 minutes</u> (<u>ideally ASAP</u>)
≥155	≥105-110	Alternative triggers*

Recommendations apply to all forms of hypertension:

Gestational HTN = Preeclampsia = Severe Preeclampsia

Preeclampsia Collaborative Participants

Northern CA

- Alta Bates Summit
- Contra Costa Regional Med Ctr
- Doctor's Hospital of Modesto
- John Muir Medical Center
- Kaiser Hayward
- Kaiser Oakland
- Kaiser Roseville
- Kaiser Santa Clara
- Mercy San Juan Med Center
- NorthBay Medical Center
- Salinas Valley Memorial
- Sonora Regional Med Center
- Sutter Medical Center

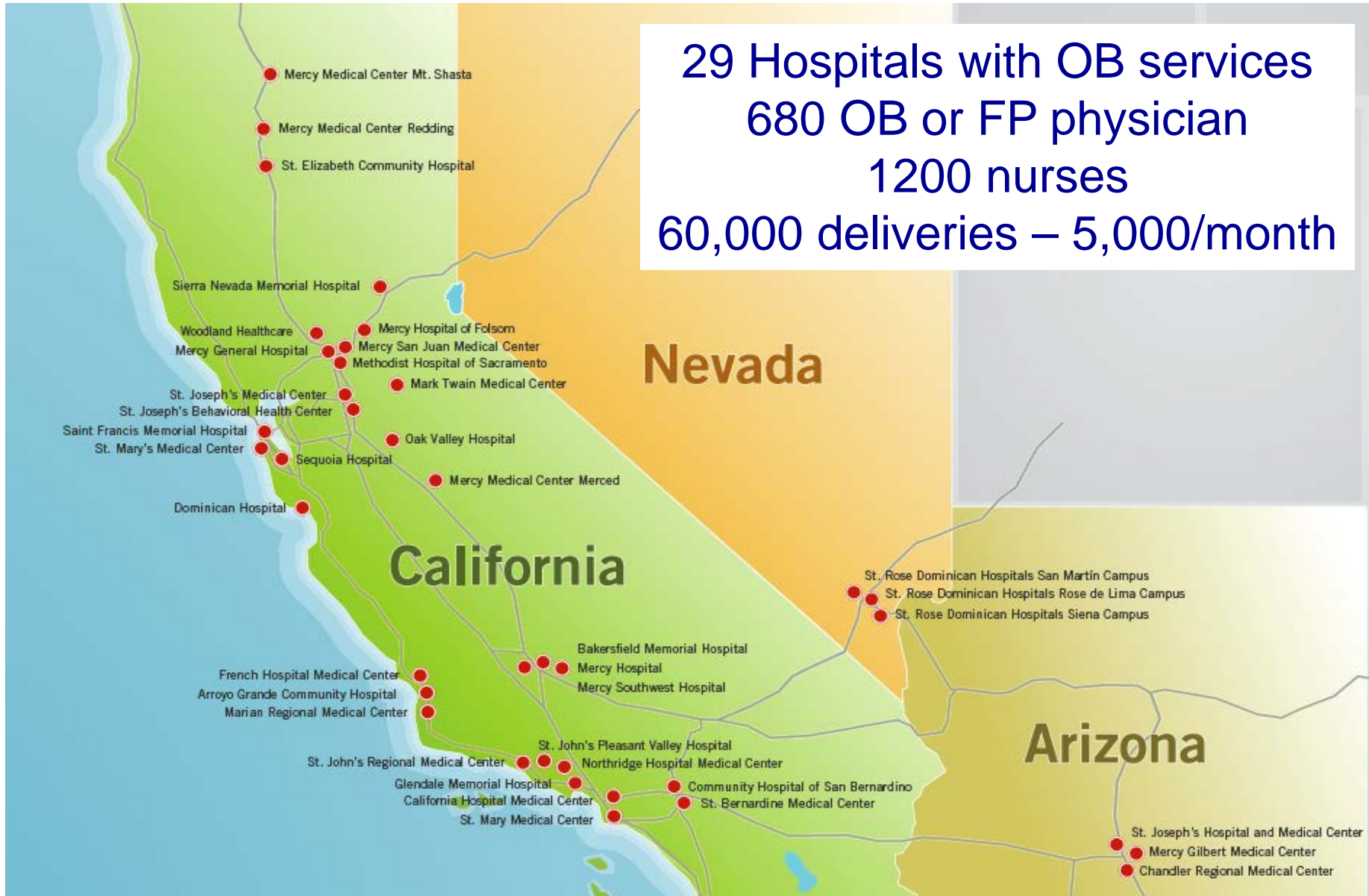
Southern CA

- Arrowhead Regional Med Ctr
- Cedars Sinai Med Center
- Citrus Valley Med Center
- Henry Mayo Newhall Memorial
- Kaiser San Diego
- Kaiser West LA
- Long Beach Miller
- Riverside County Regional Med Ctr
- St. Jude Medical Center
- Saddleback Memorial
- UCLA
- St Bernardine Medical Center
- Maricopa (Phoenix, AZ)

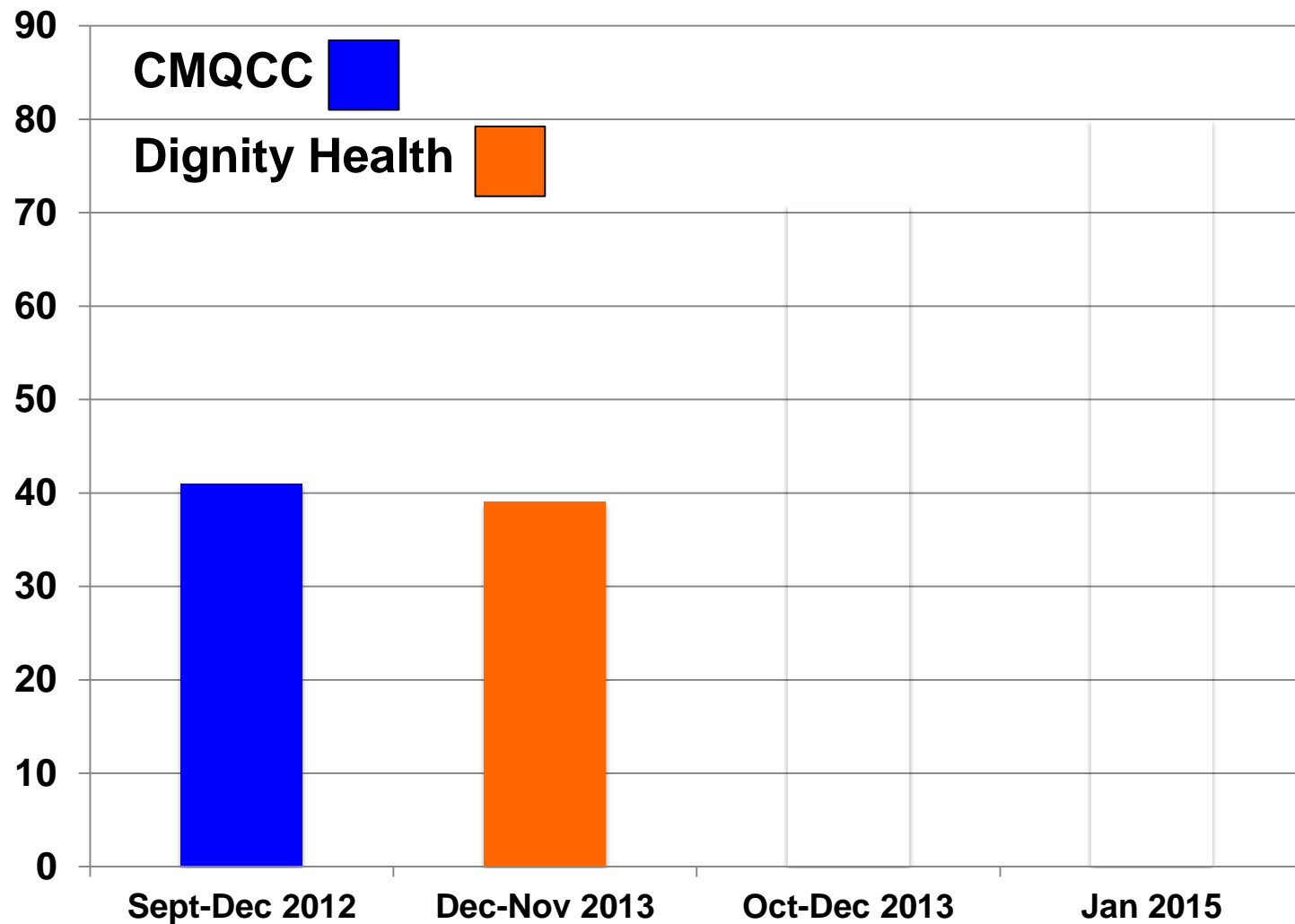
Represents ~ 82,000 births in 2011 (1:6)

Dignity Health

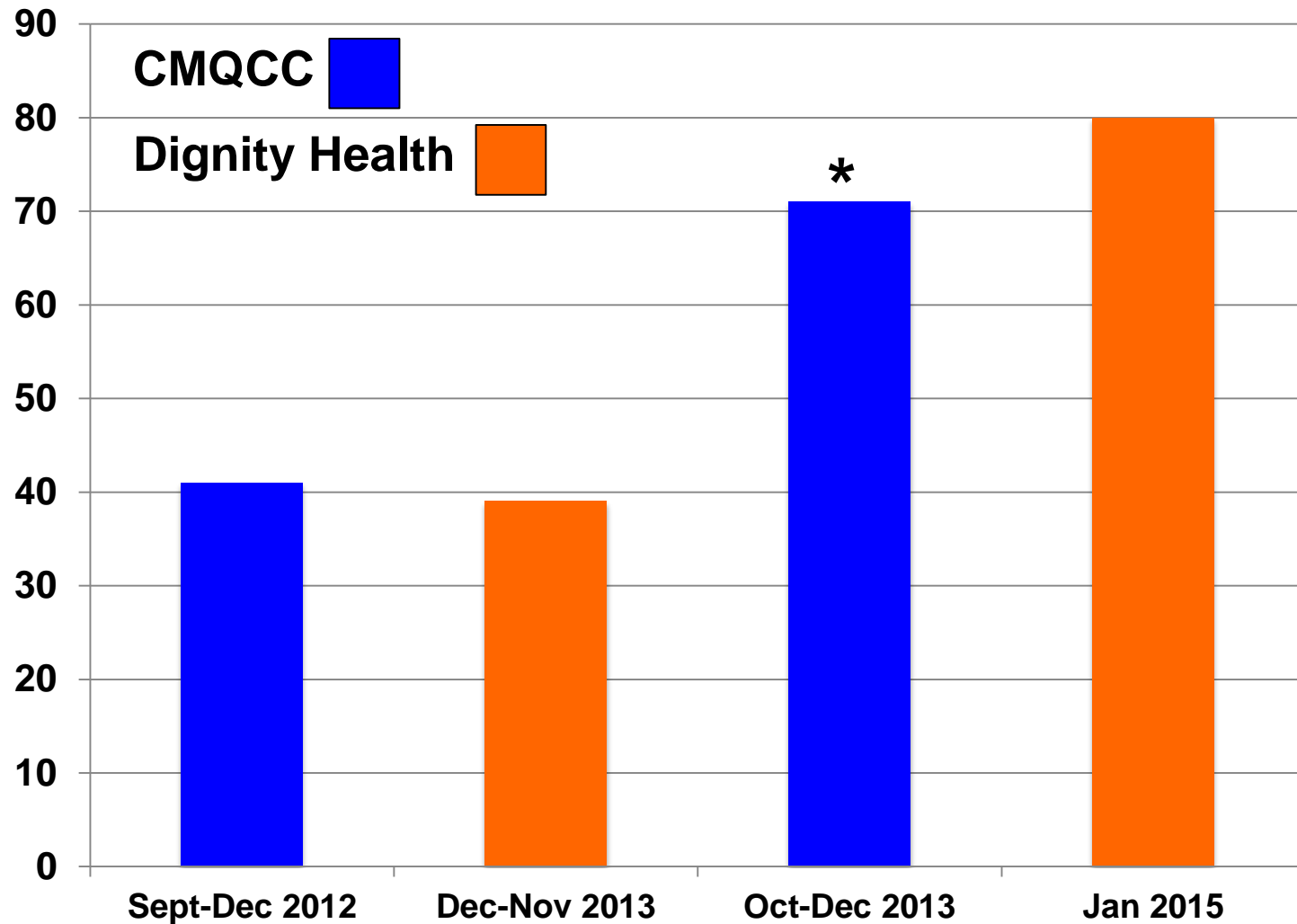
29 Hospitals with OB services
680 OB or FP physician
1200 nurses
60,000 deliveries – 5,000/month



Timely Treatment of BP



Timely Treatment of BP



CMQCC Preeclampsia Toolkit

- ***First line therapy:*** treatment of critically elevated BP with either ***IV labetalol or hydralazine.***
- Patients without IV access ***oral nifedipine may be used (10 mg)***
- ***Oral labetalol*** would be expected to be less effective due to its' slower onset to peak and thus should be used only if nifedipine is not available in a patient without IV access.

Hypertensive Medication Administration ~ Oral v. IV

■ IV Labetalol

- Onset: 2-5 min
- *Peak: 5 min*

■ PO Labetalol:

- Onset: 20 min-2 hrs
- *Peak: 1-4 hrs*

■ IV Hydralazine

- Onset: 5-20 min
- *Peak: 15-30 min*

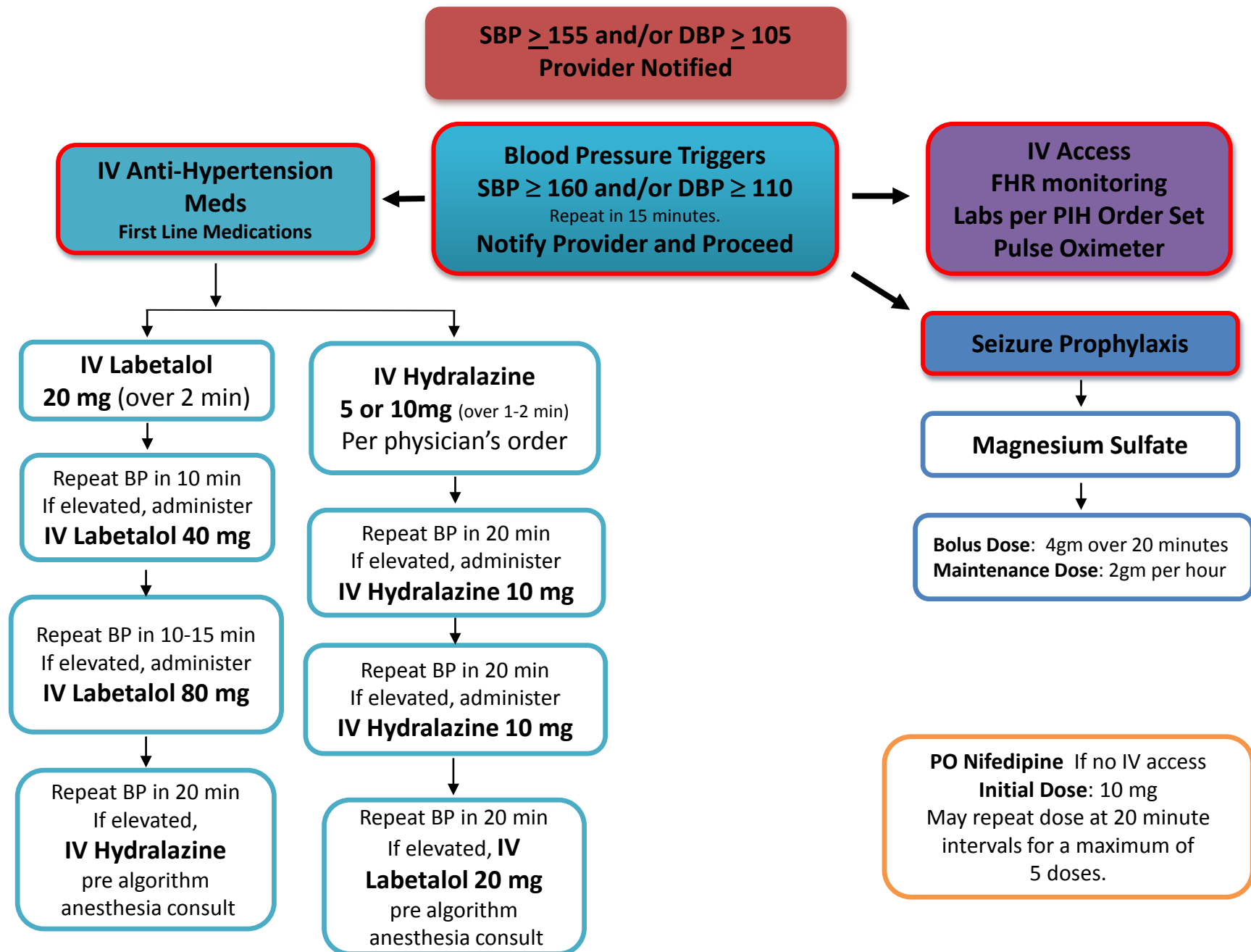
■ PO Nifedipine

- Onset: 5-20 min*
- *Peak: 30-60 min*

*PO, (oral) not sublingual nifedipine, onset of action is 15-30 minutes depending on the reference source.
Am J Emerg Med. 1985 (6):524-30
BJOG 2012;119:78-85.

<http://www.uspharmacist.com/content/d/feature/i/1444/c/27112/>

Severe Hypertension Treatment Algorithm



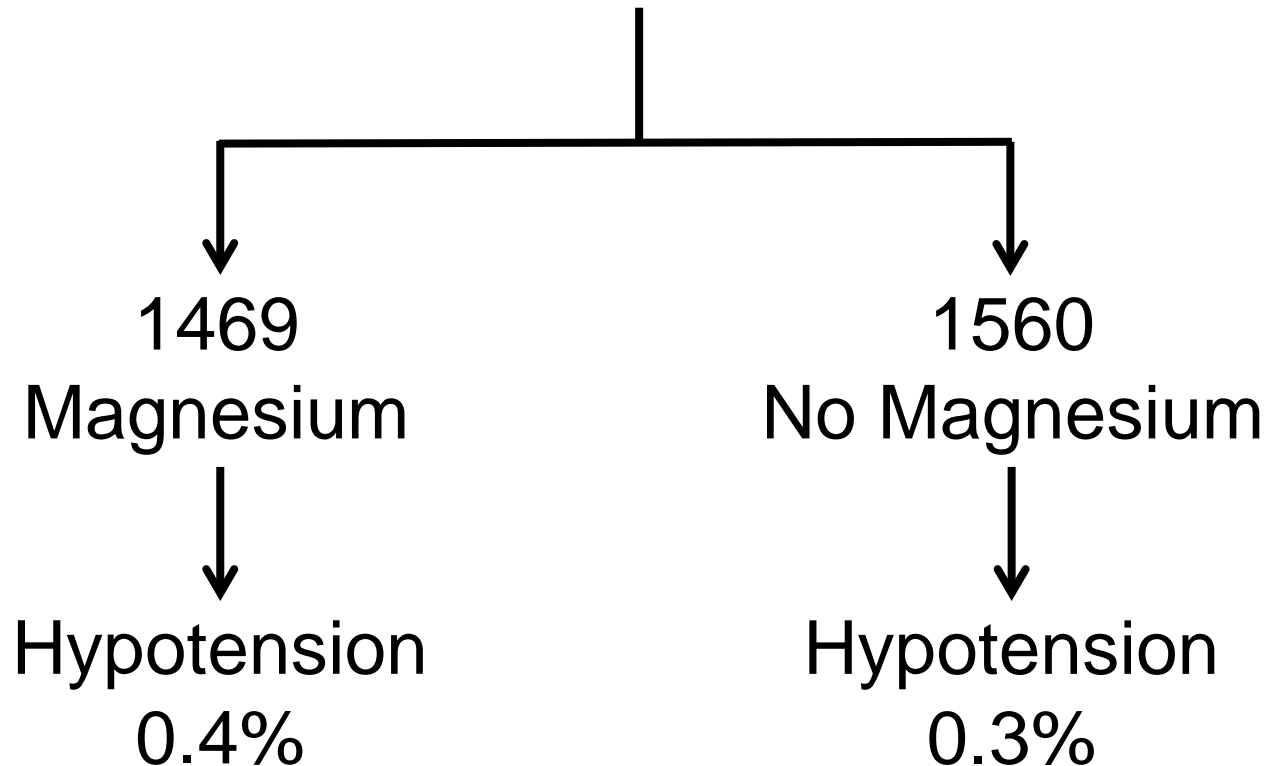


Key Clinical Pearl

Algorithms for acute treatment hypertension and eclampsia should be readily available or *preferably* posted in all clinical areas that may encounter pregnant women.

Magnesium Sulfate and Nifedipine

3029 received Nifedipine for BP treatment



Who Should Get Magnesium?

	Mild Preeclampsia	Severe Preeclampsia	Eclampsia
ACOG			X
NICE			X
SOGC			X
CMQCC			X
WHO			X

Who Should Get Magnesium?

	Mild Preeclampsia	Severe Preeclampsia	Eclampsia
ACOG		X	X
NICE		X	X
SOGC		X	X
CMQCC		X	X
WHO		X	X

Who Should Get Magnesium ?

	Mild Preeclampsia	Severe Preeclampsia	Eclampsia
ACOG	NU [#]	X	X
NICE		X	X
SOGC	X*	X	X
CMQCC	X*	X	X
WHO	X	X	X

* Should be considered: **NNT = 109 for mild, 63 for severe**

(NNT = number needed to treat)

Not Universally”

Who Should Get Magnesium?

- Which patient is safer on your OB unit:
 - A patient receiving magnesium ?
 - A patient that is having a seizure ?

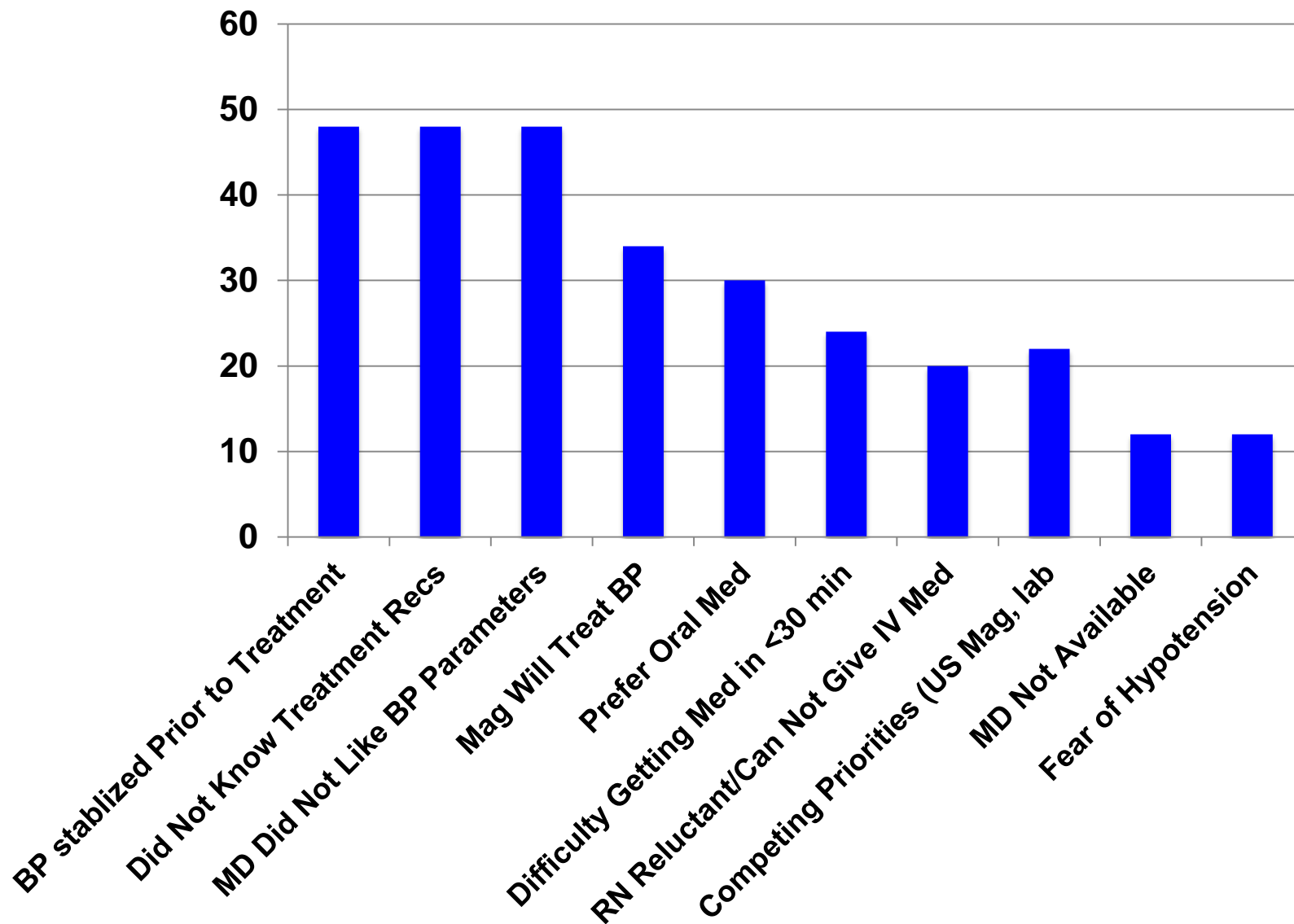
NNT = 109 for mild, 63 for severe
(NNT = number needed to treat)

Magpie Trial Collaboration Group.

Do women with pre-eclampsia, and their babies, benefit from magnesium sulfate?

- 58% reduction in seizures
- 45% reduction in maternal death*
- 33% reduction in placental abruption

Barriers to BP Treatment





BP Normalized

- BP taken in sitting or semi-fowlers
- Cuff size correct
- Nurse verifies cuff placed correctly
- Automated cuff calibrated
- Verification occurs within 15-20 min of abnormal value

“Did Not like The BP Parameters”

Blood Pressure and Severe Maternal Morbidity

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) ^a	Moderately severe (173–192) ^a	Very severe (193–260) ^a	<i>P</i> value	Mildly severe (105–112) ^a	Moderately severe (113–122) ^a	Very severe (123–167) ^a	<i>P</i> value
Treatment status ^b	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.

	Mild	Moderate	Severe
Systolic BP	160-172	173-192	>192
Diastolic BP	105-112	113-122	>123

Magnesium Sulfate

is not an antihypertensive

- 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.

	sBP	sBP 30 min	sBP 120 min	dBp	dBp 30 min	dBp 120 min
Mild Group	145 ±10	143 ±13	141 ±14	87 ±10	79 ±9	82 ±9

“Prefer Oral Medication”

Meeting treatment goal of <155/105

Medication	n	Column %	Pretreatment SBP Mean (SD)	Pretreatment DBP Mean (SD)	Met treatment goal	
					n	Row %
IV hydralazine	611	33.9	177 (15)	102 (12)	418	68.4
IV labetalol	1057	58.6	175 (14)	102 (12)	748	70.8
PO nifedipine	38	2.1	174 (14)	100 (12)	31	81.6
PO labetolol	98	5.4	175 (15)	102 (10)	52	53.1

NS

95% CL, 95% confidence limits; DBP, diastolic blood pressure; IV, intravenous; OR, odds ratio; PO, per os; SD, standard deviation.

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

“Can Not Get Medication <30-60 min”

- Work with pharmacy
- Stock on labor and delivery with emergency override
- Get *Pharmacy and Therapeutics Committee* to approve IV labetalol for use on OB floor
- Nursing and OB education for use
- Have emergency *medication box*

Emergency Medication Box for Severe Preeclampsia and Eclampsia

L&D Severe Preeclampsia & Eclampsia Box – Content and Dose Guideline	
Magnesium 20 grams/500 ml bag	<u>IV (Use Magnesium Sulfate Continuous Infusion under L&D protocol in Alaris Pump Library):</u> <i>Initial (Loading Dose): 4-6 g (100 ml – 150 ml) over 20 minutes</i> <i>Maintenance Dose: 1-2 g/hour (25 ml/hr – 50 ml/hr) continuous infusion</i>
Labetalol 100mg/20ml vial	<i>Initial: Draw 4 ml from the vial.</i> 20 mg (4 ml) IV bolus followed by 40 mg (8 ml) if not effective within 10 minutes; then 80 mg (16 ml) every 10 minutes (maximum total dose of 300 mg/60ml)
Hydralazine 20mg/ml vial	<i>Initial: Draw 0.25 ml from the vial.</i> 5-10 mg (0.25-0.5 ml) doses IV every 15-20 minutes
Esmolol 100mg/10ml vial (By Anesthesiologists ONLY)	1-2 mg/kg (0.1-0.2 ml/kg) IV over 1 minute
Propofol 10mg/ml, 20ml vial (By Anesthesiologists ONLY)	30-40 mg (3-4 ml) IV bolus
Calcium gluconate 1000 mg/10ml vial	1000 mg/10 ml IV over 2-5 minutes
Labetalol 200 mg tablets	200 mg PO and repeated in 30 minutes if needed
Nifedipine 10 mg PO	10 mg PO and repeated in 30 minutes if needed
Supply contents	3 ml, 10 ml, and 20 ml syringes, appropriate needles and appropriate tubing sets

Kindly used with permission of Stanford University Medical Center and Gillian Hilton, MD 2013

“Competing Priorities”

- Verify BP
- IV access
- Labs collected
- Physician notified → chain of command
- Antihypertensive medication
- Magnesium sulfate started
- Labs sent
- Imaging or other diagnostics

Postpartum Care – *Delivery is The Cure*

Table III. Prodromal symptoms in patients with late postpartum eclampsia

<i>Symptom</i>	<i>Late postpartum eclampsia (No.)*</i>	<i>Before delivery or early postpartum (No.)†</i>	<i>OR (95 % CI)</i>
Headache	20 (87.0%)	41 (62.1%)	4.1 (1.1, 15.1)
Visual symptoms	10 (43.5%)	15 (22.7%)	2.6 (1.0, 7.2)
Nausea or vomiting	5 (21.7%)	17 (25.8%)	0.8 (0.3, 2.5)
Epigastric pain	2 (8.7%)	9 (13.6%)	0.6 (0.1, 3.0)
At least 1	21 (91.3%)	46 (69.7%)	4.6 (1.0, 21.4)

*n = 23.

†n = 66.

- **91% had at least 1 prodromal symptom**
- **52% had more than one prodromal symptom**
- ***100% had headache or visual symptoms***
- **Only 33% (7/21) sought care for their symptoms**

AUTHOR'S CONCLUSION: "...efforts should be directed to the education of the health care providers and patients regarding the importance of prompt reporting and evaluation of symptoms of preeclampsia during the postpartum period."

Key Clinical Pearl

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

Key Elements of CMQCC and Dignity Health Bundles for Hypertensive Patients

- Staff education and correct BP measurement
- Notify the physician if BP >155/105 mmHg*
- Standardized treatment of BP within 1 hr if >160/110 mmHg
- Uniform policy for use of MgSO₄ for Severe Preeclampsia and should be consider in patients with preeclampsia
- Early postpartum follow-up (3-14 days) if diagnosis of hypertension
- Standardized patient educational materials

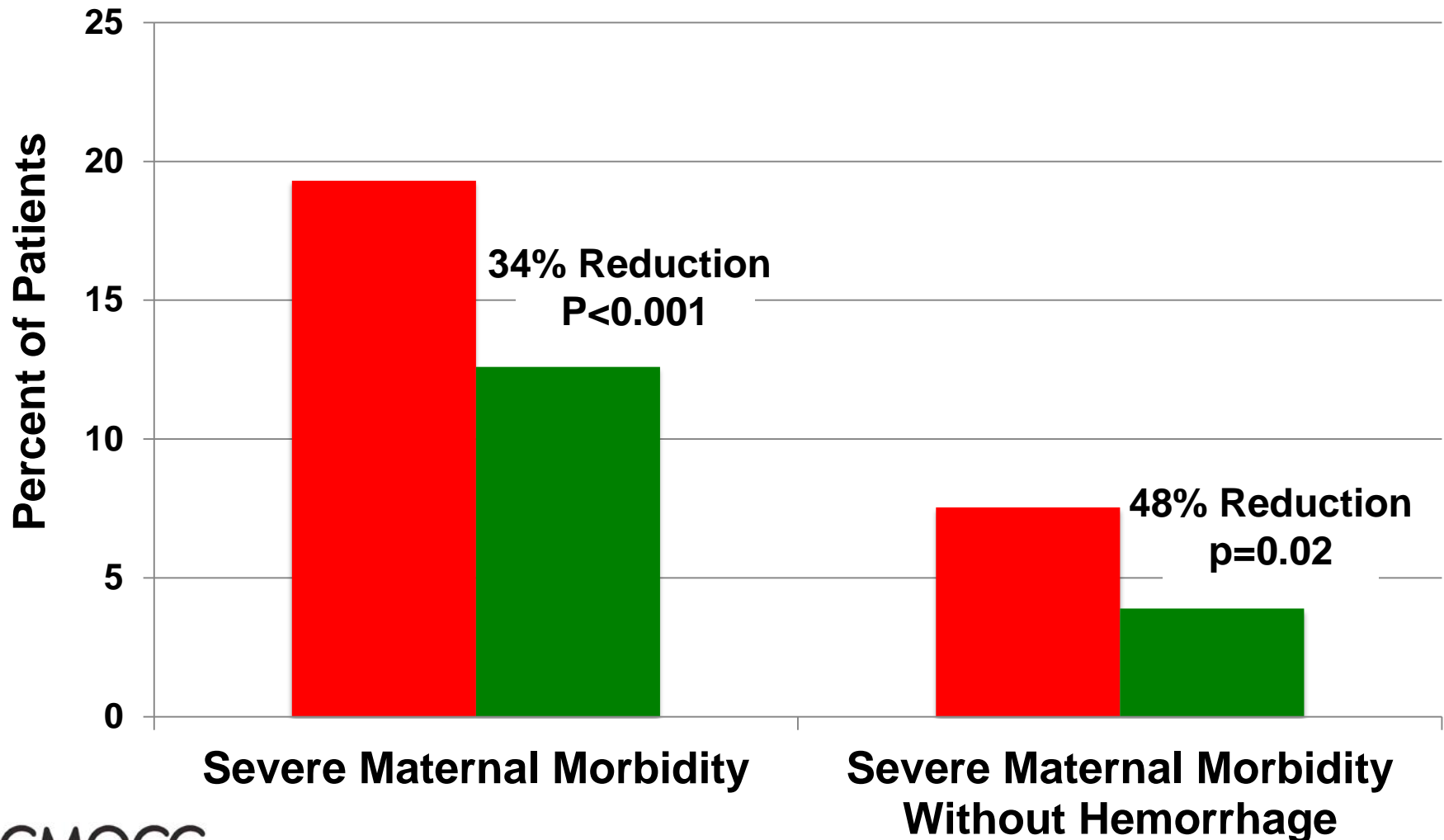


Recipe for change:

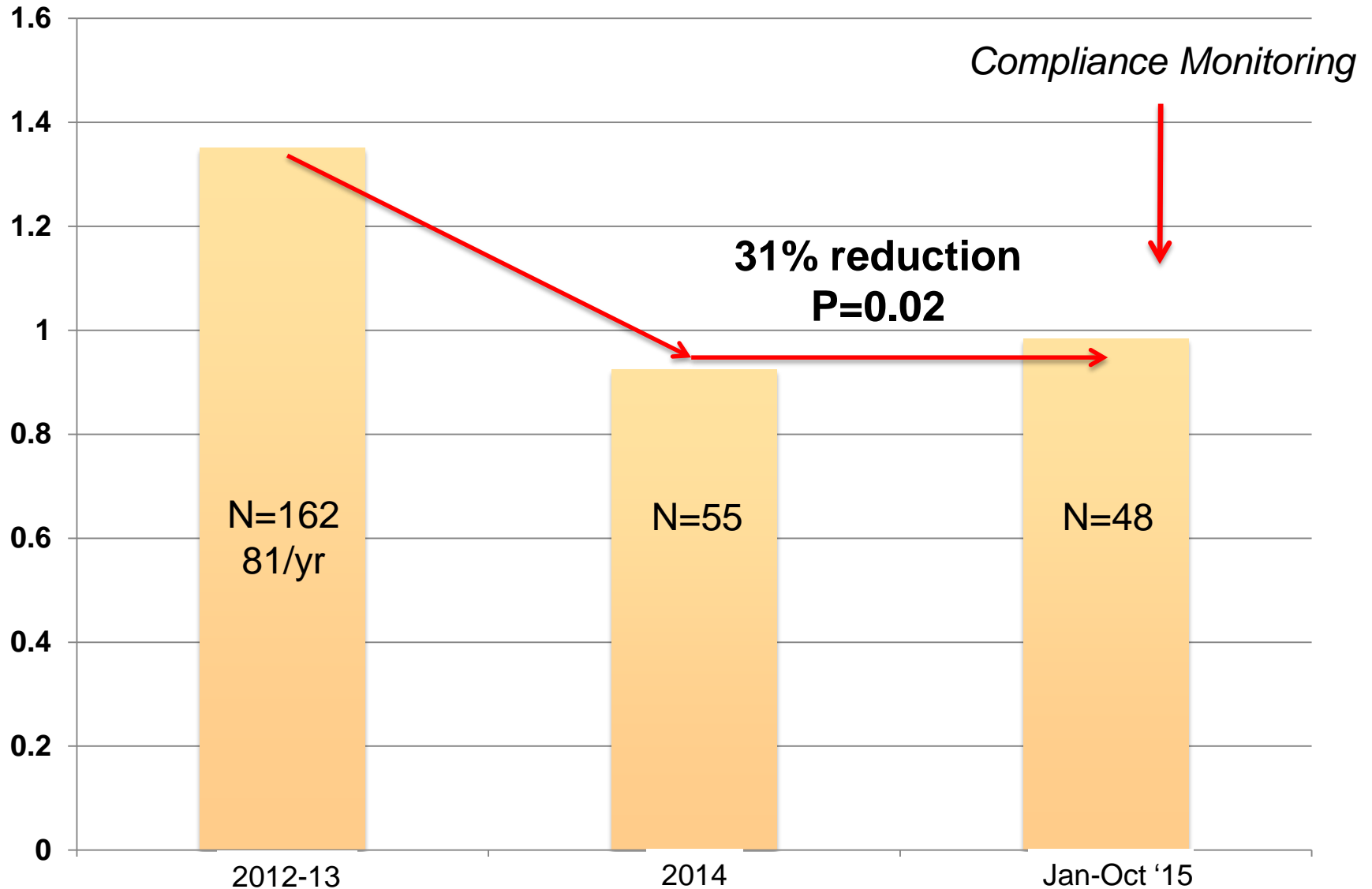
*“A lot of enthusiasm
and a little data doesn’t hurt”*

Bill Gates,
Steven Colbert Show 1/30/13

Severe Maternal Morbidity Pre- and Post-Toolkit Implementation



Dignity Health Rate of Eclampsia *Pre- and Post-Hypertension Bundle*

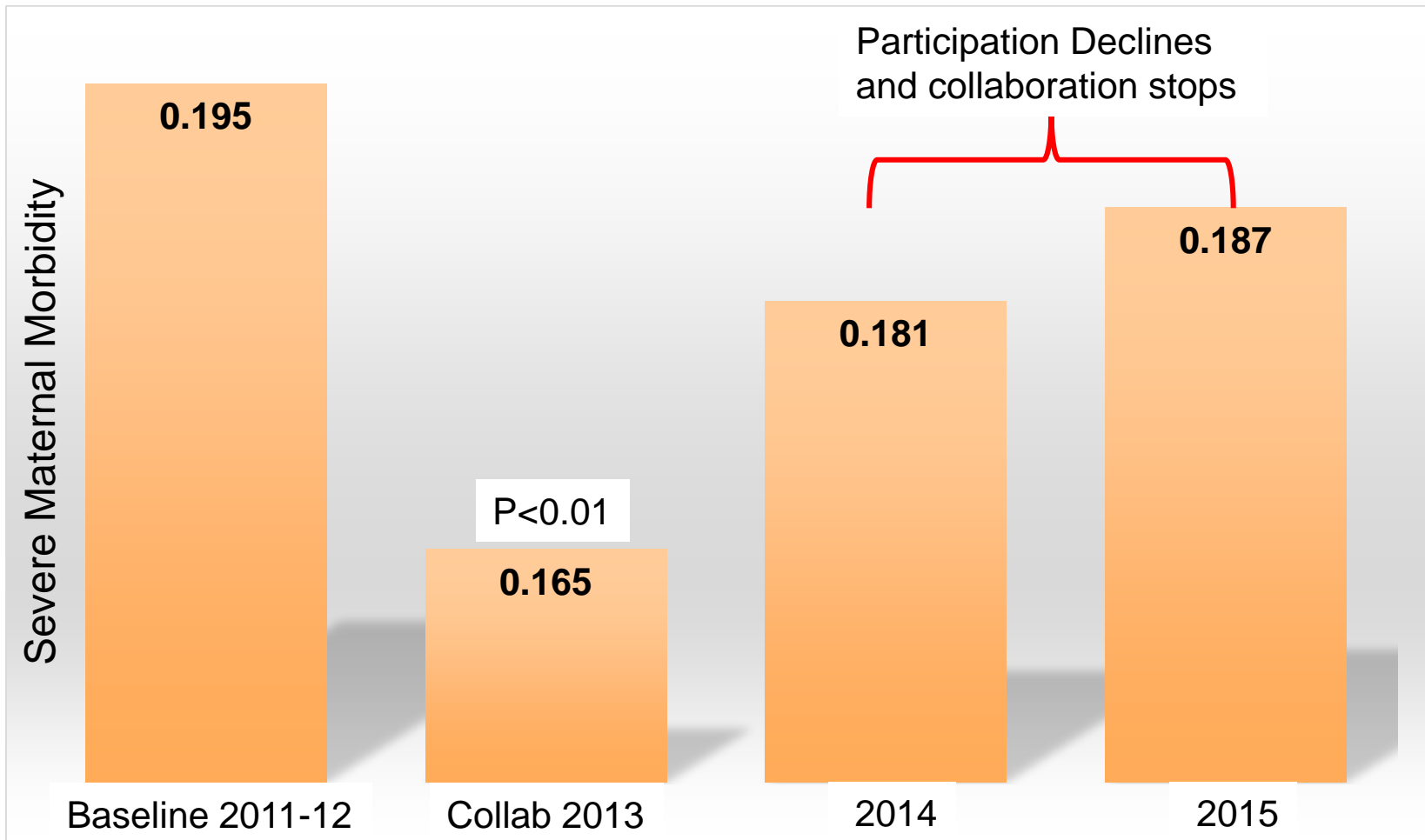


How Well Do We Do?

- Post-“rollout of recommendations”
 - no monitoring:
 - **52% met all parameters**
 - 38% missing 1 element
 - 10 missing 2 elements
 - None missing all elements
 - 6 months with **compliance monitoring** and monthly release of data: **>85% meeting metrics**
- BP Treatment: 46%
Magnesium: 28%
Follow-up: 26%

Final Task Sustaining Results...

monitoring and drift prevention



Making an Impact in the Management and Outcome for Patients with Preeclampsia

- ✓ Recognize and Don't Ignore Clinical Signs
- ✓ Treat and Control Blood Pressure
- ✓ Magnesium for Seizure Prophylaxis
- ✓ Delivery – 34, 37 weeks
- ✓ Postpartum Surveillance/Treatment



Summary

- Improvement in care of hypertensive and preeclamptic patients will require detailed review of local issues
- Physician buy-in should be significantly easier with ACOG, CMQCC, Counsel on Patient Safety
- Nursing education on important triggers, patient education, and correct measurement techniques
- *Within in a short period of time*
patient outcomes improve!