

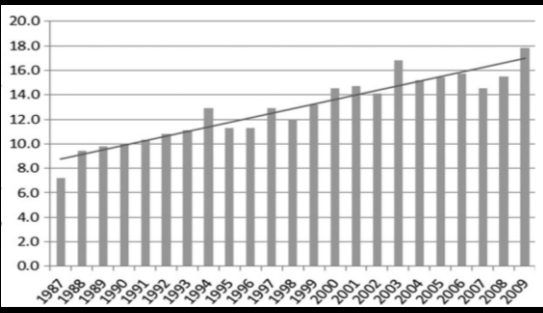
HYPERTENSION IN PREGNANCY: PREVENTING SEVERE MATERNAL MORBIDITY & MORTALITY THROUGH THE IMPLEMENTATION OF EVIDENCED BASED PROTOCOLS

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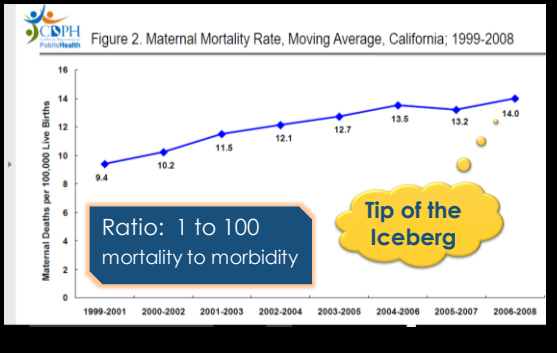
LEARNING OBJECTIVES

- Report the incidence of maternal morbidity due to hypertension in pregnancy,
 - and the evidence that these problems are amenable to change
- Compare the different medications used to manage hypertension in pregnancy,
 - including a hypertensive crisis
- Examine the factors that supported *Conquering Change in the Healthcare Environment*

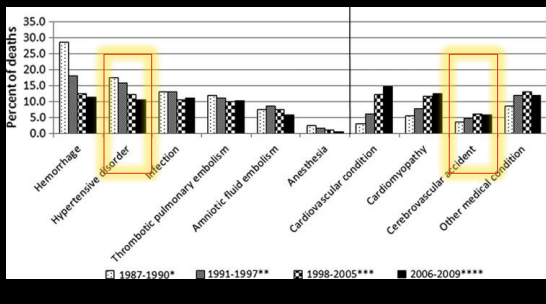
MATERNAL MORTALITY RATE: USA



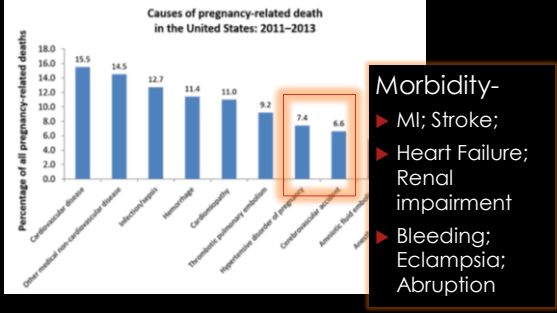
MATERNAL MORTALITY RATE: CA

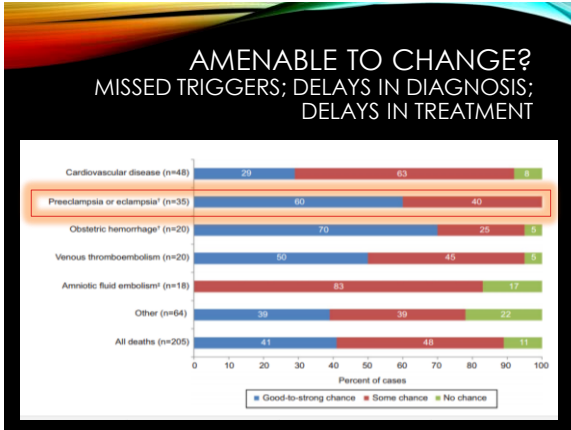


CAUSES OF MATERNAL MORTALITY OVER TIME- 1987 TO 2009



CAUSES OF MATERNAL MORTALITY 2011 TO 2013: HYPERTENSION 7.4% / CVA 6.6%





PATIENT SAFETY BUNDLE: READINESS, RECOGNITION, RESPONSE, REPORT

HYPERTENSION IN PREGNANCY

Etiology

- BP= Flow X Resistance
- Causes of HTN
 - ↑ FLOW
 - Hypervolemia
 - Cardiac Output
 - Contractility
 - ↑ RESISTANCE
 - Vasoconstriction

Critical Parameters

- SBP > 160
 - SV + Vasoconstriction
- DBP > 105
 - Vasoconstriction
- Acute rise in MAP > 30

Pulse Pressure=

SBP – DBP= 1/2 SV

2 x Pulse Pressure = SV

HTN TREATMENT: DEPENDENT ON CAUSE

Increased Flow	Increased Resistance
<ul style="list-style-type: none"> • Hypervolemia- <ul style="list-style-type: none"> • Decrease fluids and sodium • Loop diuretic • Vasodilator • ↑B1 Stimulation- <ul style="list-style-type: none"> • Beta Blocker • Vasodilator 	<ul style="list-style-type: none"> • ↑ Catechols <ul style="list-style-type: none"> • Control pain • Correct O₂ & CO₂ • Control ↑ ICP • Vasodilator • ↑ Endocrine <ul style="list-style-type: none"> • Preeclampsia-Delivery Placenta • Vasodilator & Beta Blocker

TREATMENT CHOICES

<u>Vasodilators</u> - Hydralazine (Apresoline) - Nitroprusside(Nipride) - Nitroglycerine (Tridil) - Nifedipine (Procardia)	<u>Beta Blockers</u> - Propranolol (Inderal) - Esmolol (Brevibloc) - Atenolol (Tenormin) - Labetalol (Normodyne)
<u>ACE Inhibitors</u> <i>Avoid in pregnancy</i> - Enalapril	<u>Adrenergic Agonist</u> - Clonidine (Catapres)

TOP 3 HTN MEDICATIONS USED IN PREGNANCY

<ul style="list-style-type: none"> • Lower – Labetalol • Hypertension- Hydralazine • Now- Nifedipine 	Labetalol- 20, 40, 80 mg IVP Repeat every 10 minutes Hydralazine- 5 or 10 mg IVP Repeat every 20 minutes Nifedipine- 60 mg PO Repeat every 30 minutes
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CASE STUDY #1

- 24 yo G1P0
- 36 weeks
- BP= 165/108
- Active labor
- Preeclampsia
 - Elevated AST/ALT
 - Proteinuria 2+
 - Platelets- 105K
 - Headache



TREATMENT- VASODILATOR +/- BETA BLOCKER

- 165- Mildly hyperdynamic
- 110- Significant vasoconstriction
- Pulse pressure- 55 mild increase of flow/volume
- **Problem**- Increased resistance
 - *Vasoconstriction due to Pain & Preeclampsia* (Increased Catechol, Endocrine)
- **Plan**- Pain Management & Deliver-
 - Eliminates sources of hormones

IDENTIFY TRIGGERS RAPID DIAGNOSIS TIMELY TREATMENT

- Re-check BP in 15 m
- Dx- Hypertensive Crisis
- Notify Physician-
 - TORB- "Implement Hypertension protocol; Use Labetalol as 1st Priority"
- Treatment started - 30 min of presentation
- Labetalol 1st priority:
 - Give 20 mg IVP; Wait 10 min
 - BP still > 160 or 105
 - Give 40 mg IVP; Wait 10 min
 - BP < 160/105
 - Greater than 34 wks- Pain relief & Deliver

CASE STUDY #2

- 35 yo G3P2
- 29 weeks
- BP= 210/110
- Obese (BMI- 52), Chronic HTN, T2DM
 - ↓ renal function
 - poor compliance- DM
- Normal preeclampsia labs
- Creatinine ↑ ; Hgb ↓



TREATMENT-

BETA BLOCKER; LOOP DIURETIC; VASODILATOR


- 210- Significant Hyperdynamic
- 110- Significant Vasoconstriction
- Pulse pressure- significant increased flow
 - **PROBLEM-**
 - Increased flow – renal disease
 - Increased resistance-
 - **PLAN-**
 - Control HTN; Treat anemia
 - Reduce volume; Maintain electrolyte balance
 - Maintain fetal wellbeing

IDENTIFY TRIGGERS RAPID DIAGNOSIS TIMELY TREATMENT

- Re-check BP in 15 m
- Dx- Hypertensive Crisis
- Notify Physician-
 - TORB- "Implement Hypertension protocol; Use Hydralazine as 1st Priority"
- Treatment started - 30 min of presentation
- Hydralazine 1st priority:
 - Give 10 mg IVP; Wait 20 min
 - BP still > 160 or 105
 - Give 10 mg IVP; Wait 20 min
 - BP still > 160/105
 - Give Labetalol 20mg IVP; Wait 10 min

- Give Labetalol 40 mg
 - Wait 10 min- BP still >160/105
- ICU Admission for IV Meds-
 - Titrate to affect
 - Rapid onset, Short duration
- **Nicardipine** drip-
 - Calcium channel blocker
- **Esmolol** drip-
 - a beta 1-selective (cardio-selective) adrenergic receptor blocking agent

ICU
ADMISSION-
ESMOLAL OR
NICARDIPINE
DRIP



LONG TERM MANAGEMENT

- Pregnant patients** experiencing HTN
 - Balance- maternal & fetal wellbeing
 - Antenatal testing; Outpatient vs. Inpatient
 - Intrauterine blood flow depend on BP
 - When to deliver-
 - >34 weeks - Deliver
 - < 34 weeks- Control BP with PO meds; IVP PRN
 - Give antenatal steroids & Magnesium Sulfate-
 - 12 hours for Fetal Neuro-protection

LONG TERM MANAGEMENT

- Postpartum patients** experiencing HTN
 - F/U- Preeclampsia -**
 - Labetalol PO +/- Nifedipine PO
 - 3 to 10 days PP; BP check;
 - Pt Educ-When to return to hospital (HA)
 - F/U- Chronic HTN-**
 - Beta blocker; Loop diuretic; Vasodilator
 - Could add- Clonidine or Lisinopril
 - Address co-morbidities

CONQUERING CHANGE


IN THE HEALTHCARE ENVIRONMENT

- Implementation Science-
- Sustainment-



IMPLEMENTATION METHODS

- ☐ **Staff Education-**
 - ✓ eLearning
 - ✓ In-person
 - ✓ Posters
- ☐ **In-Situ Simulations**
 - ✓ Inter-professional
 - ✓ Shared mental model
 - ✓ Closed loop communication
 - ✓ Situation monitoring
 - ✓ Mutual support



SUSTAINMENT- SEVERE MATERNAL MORBIDITY REVIEWS

- **SMM Reviews**
 - 4 or more blood products
 - Transfer to ICU within 24 hours or birth
 - Anything- rises to level of severe morbidity
- **Inter-professional Review Process-**
 - What went right!!
 - What are our challenges??
 - Systems issues; Communication/Equipment
 - Individual issues- *Peer Review/Just Culture*

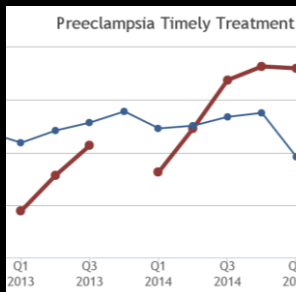
REPORTING

Outcome metrics-

- Chart audits
- Dx in 15 min
- Pyxis reports
- Tx in 30-60 min

Balance Measures-

- Unexpected Newborn Complications
- Emergency Cesearean



CA STATE WIDE REDUCTION IN MATERNAL MORTALITY



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