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California Maternal
Quality Care Collaborative

Preeclampsia Prevention and Postpartum Care in the Clinic Setting

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This slide set is considered an educational resource but does not define the standard of care in California or elsewhere. Viewers are advised to adapt the guidelines and resources based on their local facility's level of care and patient populations served and are also advised to not rely solely on the guidelines presented here.

Notes on terminology

- Throughout the presentation, the terms ‘mother’ or ‘maternal’ or ‘she’ or ‘her’ are used in reference to the birthing person. We recognize not all birthing people identify as mothers or women. We believe all birthing people are equally deserving of patient-centered care that helps them attain their full potential and live authentic, healthy lives.
- The term family is used to refer to any persons the pregnant or postpartum patient designates as such (alternatives: partners, husbands, support persons, loved ones).
- The term clinician is used to denote nursing and medical staff; whereas the term providers refers to clinicians with diagnosing and prescribing authority.
- The language around disclaimers and terminology are committee opinions and your own institution should be consulted for appropriate language to utilize.

Learning Objectives

- Identify patients at risk for preeclampsia
- Describe the role of low-dose aspirin in the prevention of preeclampsia
- Explain how to screen patients for low-dose aspirin prophylaxis
- Discuss how to educate patients about preeclampsia and low-dose aspirin
- Outline appropriate postpartum follow-up for patients diagnosed with preeclampsia
- Summarize recommended long term follow-up for patients diagnosed with preeclampsia

Equity and Targeting Racial Disparities as Top Priorities for Quality Improvement in the Management of HDP

Please visit the CMQCC Birth Equity Resources Webpage

- Foster individual, organizational and professional accountability
- Ensure that the patient, family and the clinicians caring for them are well supported, especially in the face of biases such as structural or interpersonal racism
- Outpatient leaders should demonstrate an openness to feedback and reporting of concerning situations
- Many institutions have well-developed approaches for addressing potential sources of conflict, including communication tools and team training and they should be utilized
- Outpatient leaders need to make equity and targeting racial disparities their top priorities for quality improvement, and ensure that staff are trained on implicit bias and interpersonal, institutional, and systemic racism.

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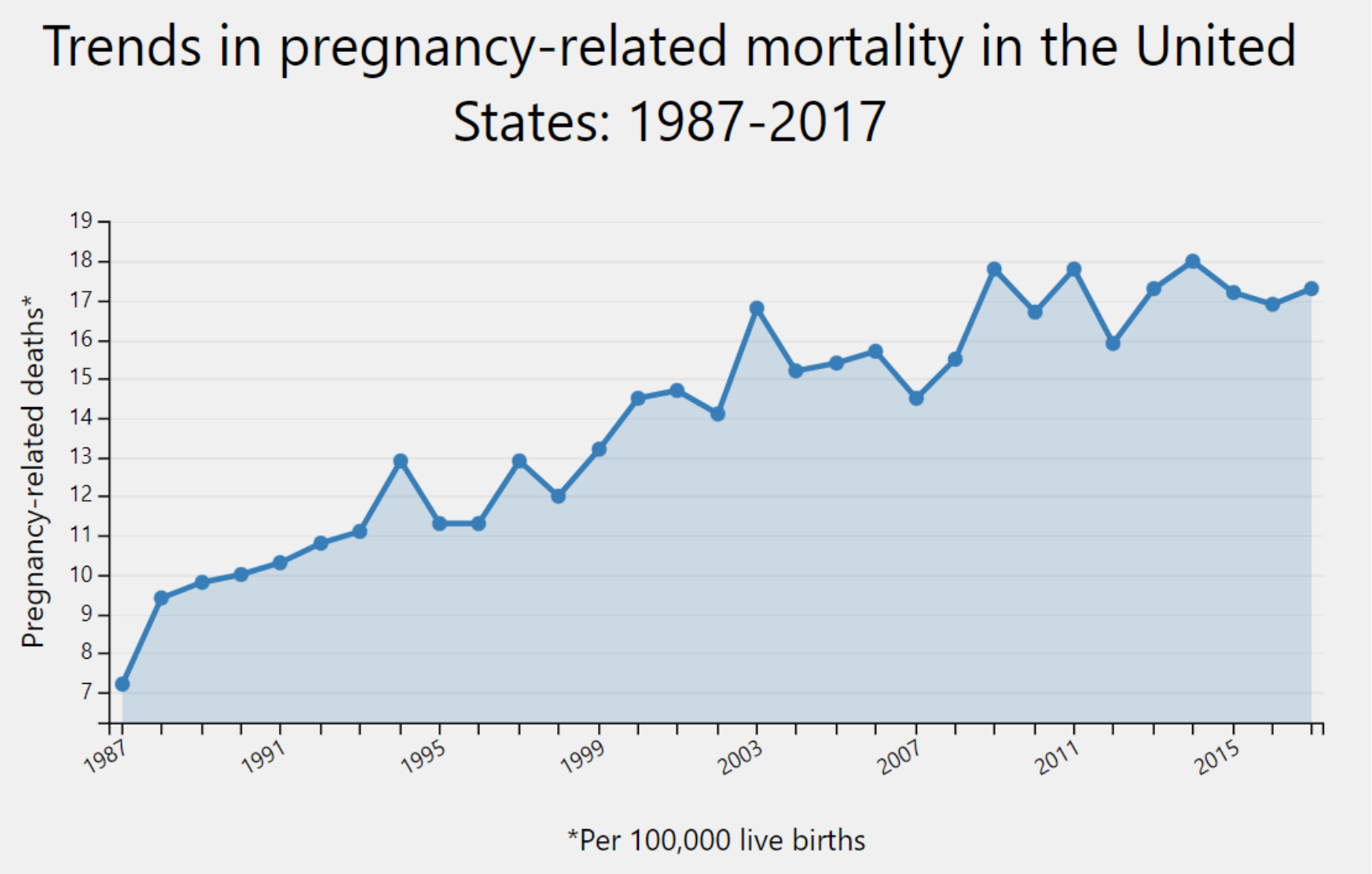
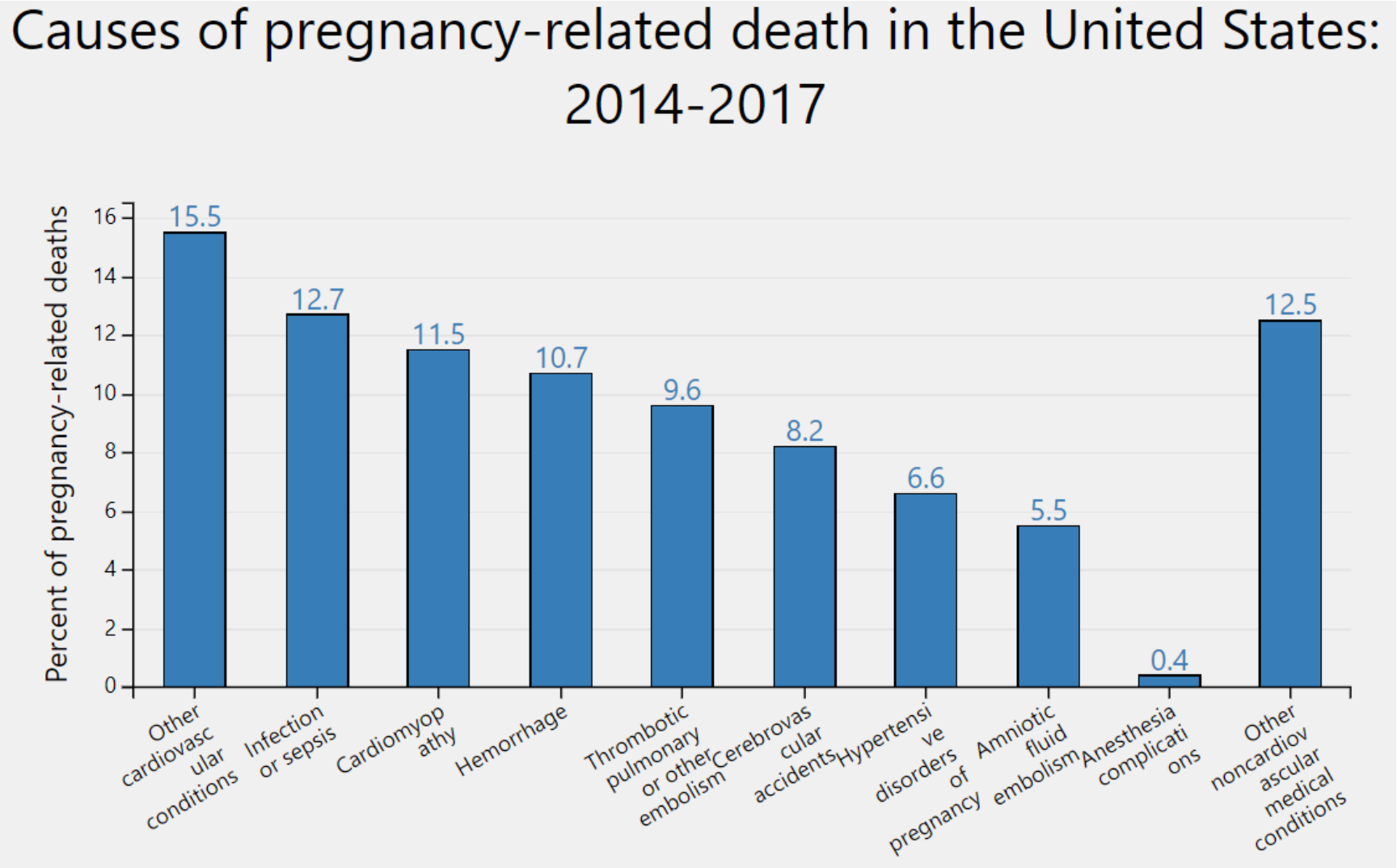
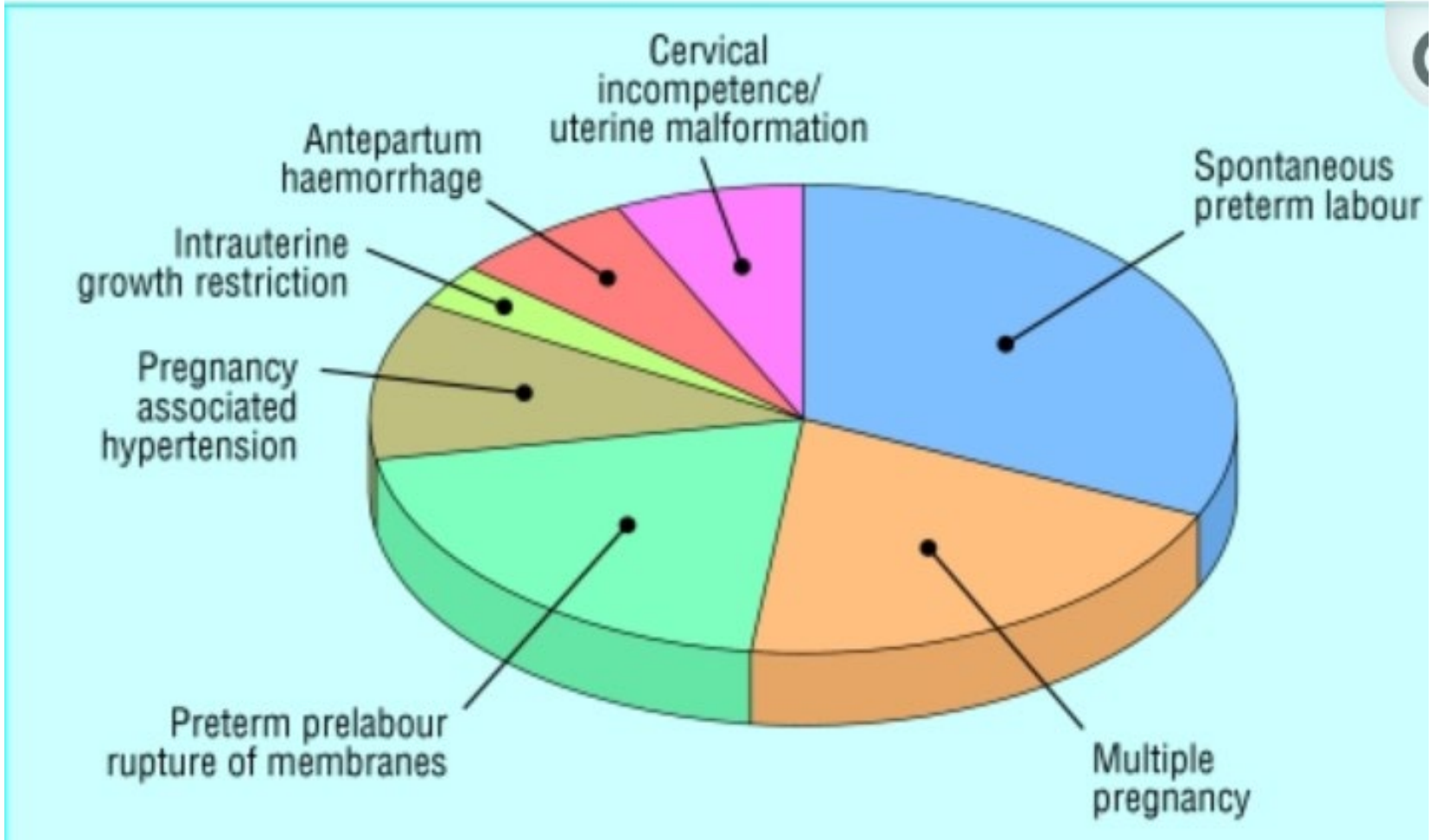


https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm#trends



https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm#trends

Epidemiology of Preterm Birth



Tucker, J. BMJ. 2004 Sep 18; 329(7467): 675–678.

Pathophysiology of preeclampsia

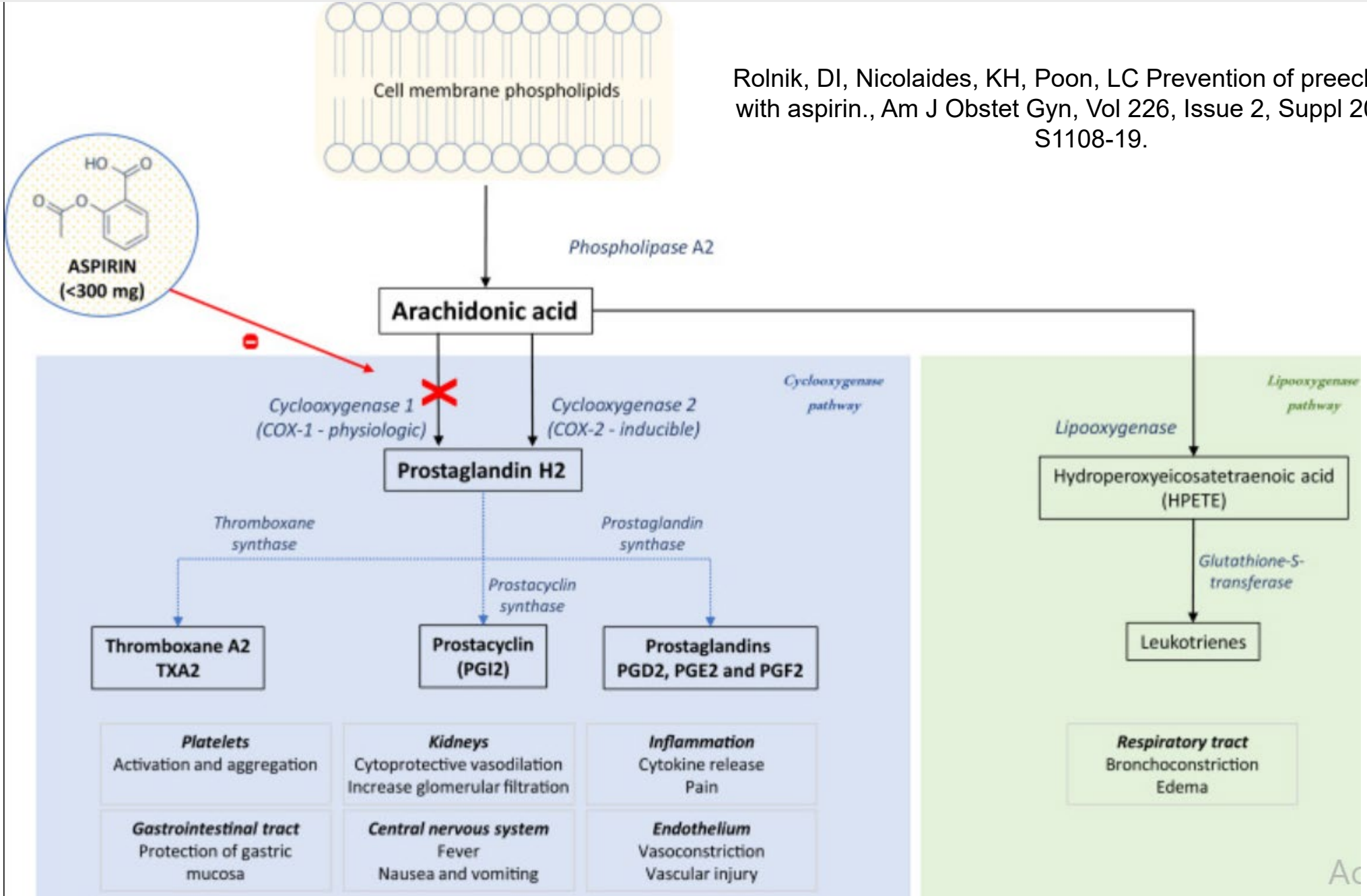
- Suboptimal trophoblastic invasion leads to impaired placentation
- Placental hypoxia
- Imbalance of angiogenic and anti-angiogenic factors
- Endothelial damage, inflammation, increased platelet aggregation, placental infarcts

Many interventions have been studied for the prevention of preeclampsia.

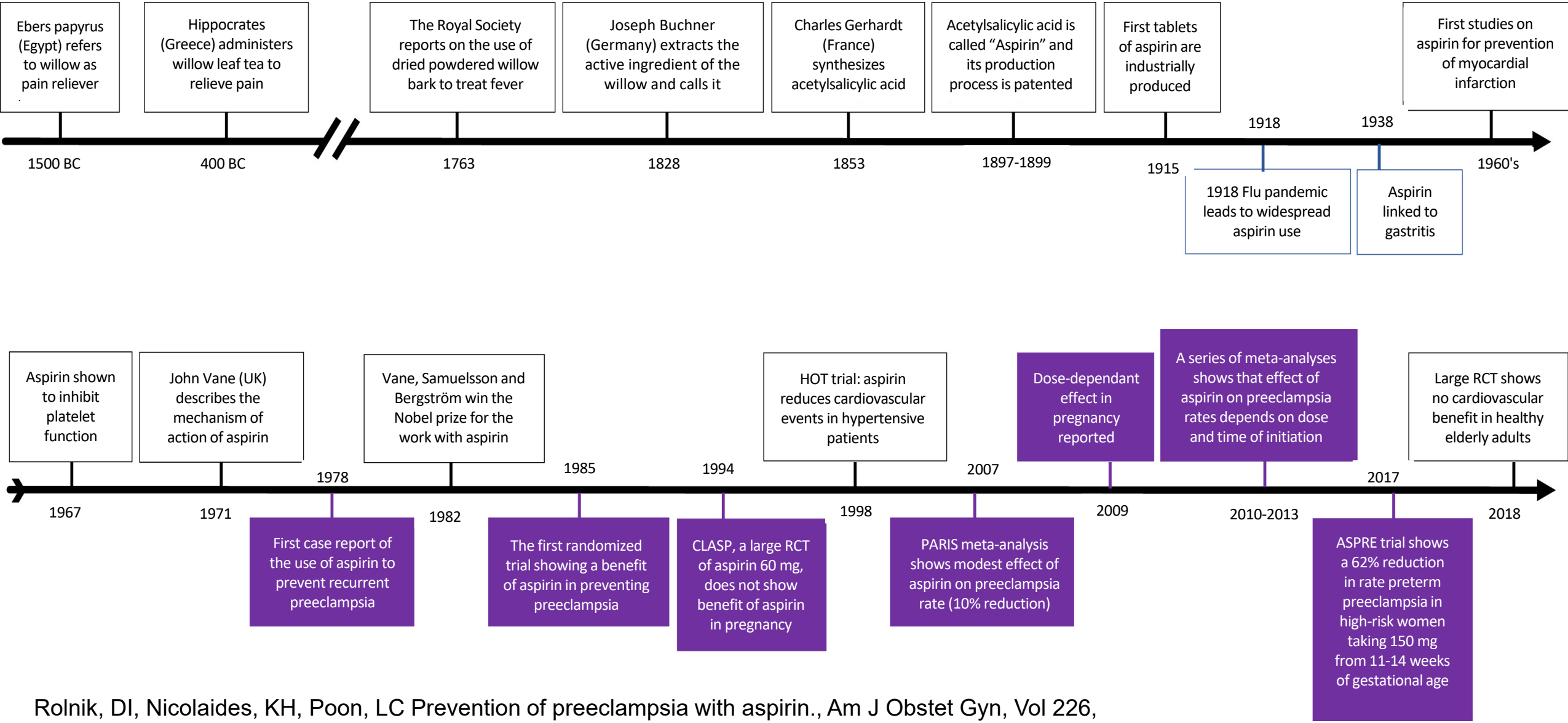
Aspirin (< 300 mg) inhibits the COX-1 enzyme and reduces inflammation and platelet aggregation.

- Could aspirin prevent preeclampsia ?

Konijnenberg A et al, AJOG 1997
Burton GJ et al, BMJ 2019



Rolnik, DI, Nicolaides, KH, Poon, LC Prevention of preeclampsia with aspirin., Am J Obstet Gyn, Vol 226, Issue 2, Suppl 2022, pg S1108-19.



Rolnik, DI, Nicolaides, KH, Poon, LC Prevention of preeclampsia with aspirin., Am J Obstet Gyn, Vol 226, Issue 2, Suppl 2022, pg S1108-19.

Effect of dose and time of treatment initiation

- A series of meta-analyses from 2010 demonstrated that
  - Aspirin is effective in reducing preeclampsia rates if initiated < 16 weeks of gestational age (RR 0.47, 95% CI 0.34 to 0.65) but confers no benefit effect when started > 16 weeks (RR 0.81, 95% CI 0.63 to 1.03)
  - Effect is mainly due to a reduction of the severe and preterm forms of disease (RR 0.11, 95% CI 0.04 to 0.33), with no significant benefit on term preeclampsia (RR 0.98, 95% CI 0.42 to 2.33)
  - There is a dose-response effect when aspirin is initiated before 16 weeks of gestational age
- Nonresponsiveness: 30% with 81 mg and 5% with 162 mg
- Chronotherapy: significantly better regulation of blood pressure when given at night
- Aspirin has been deemed safe for use in pregnancy with minor side effects
  - ~10% incidence of gastrointestinal side effects and minor bleeding episodes
  - No confirmed increase in risk of fetal malformations, placental abruption, postpartum hemorrhage, fetal intracranial bleeding

Bujold E et al, Obstet Gynecol 2010
Roberge S et al, AJOG 2017
Caron N et al, J Obstet Gynaecol Can 2009
Ayala DE et al, Chronobiol Int 2013

ASPRE Trial

Screening at 11-13w
N = 26,941

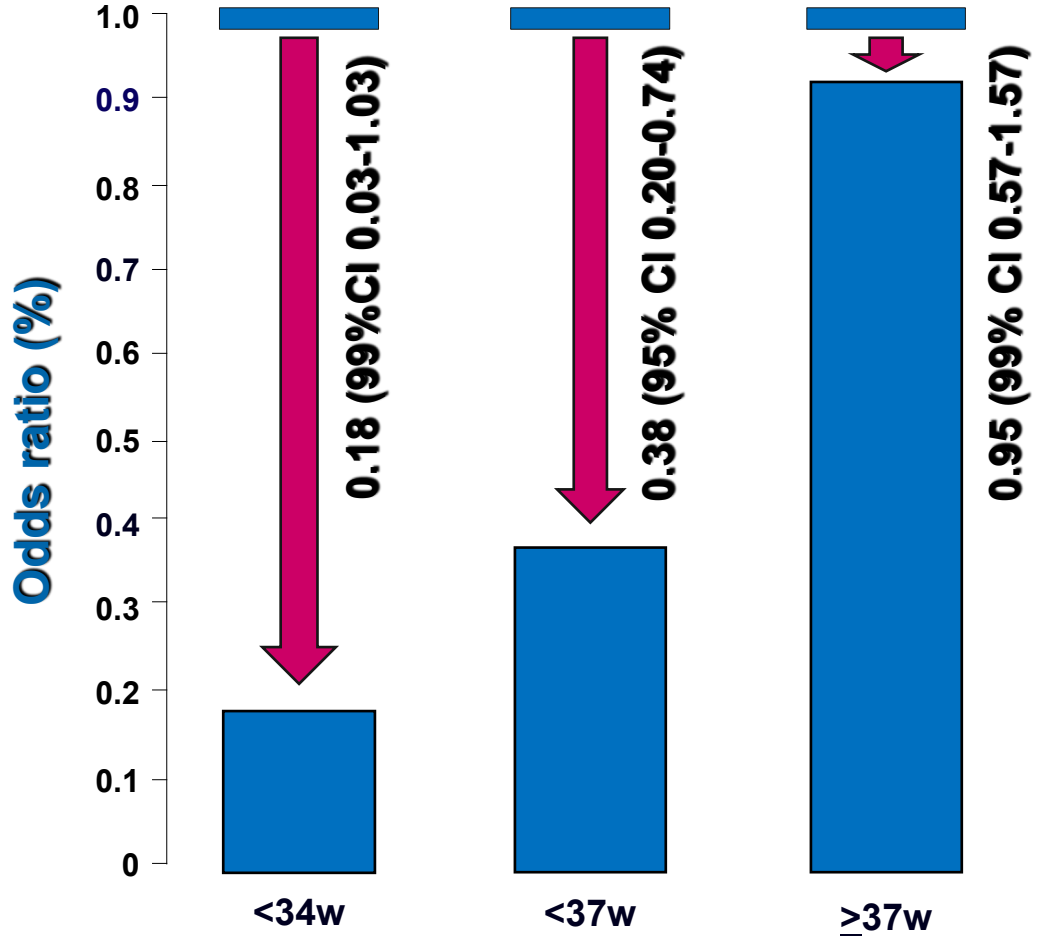
↓

High-risk group agreeing to RCT

↓

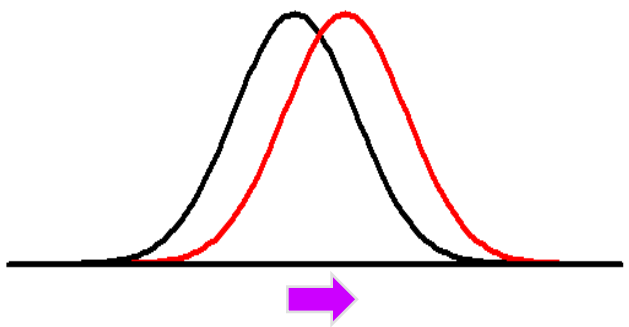
Assigned to aspirin	Assigned to placebo
N = 798	N = 822

- **Dose: 150 mg**
- **Start: 11-14 weeks**
- **Finish: 36 weeks**
- **Bedtime**
- **Outcome: Preterm preeclampsia**
- **High risk according to Fetal Medicine Foundation algorithm > 1:100**

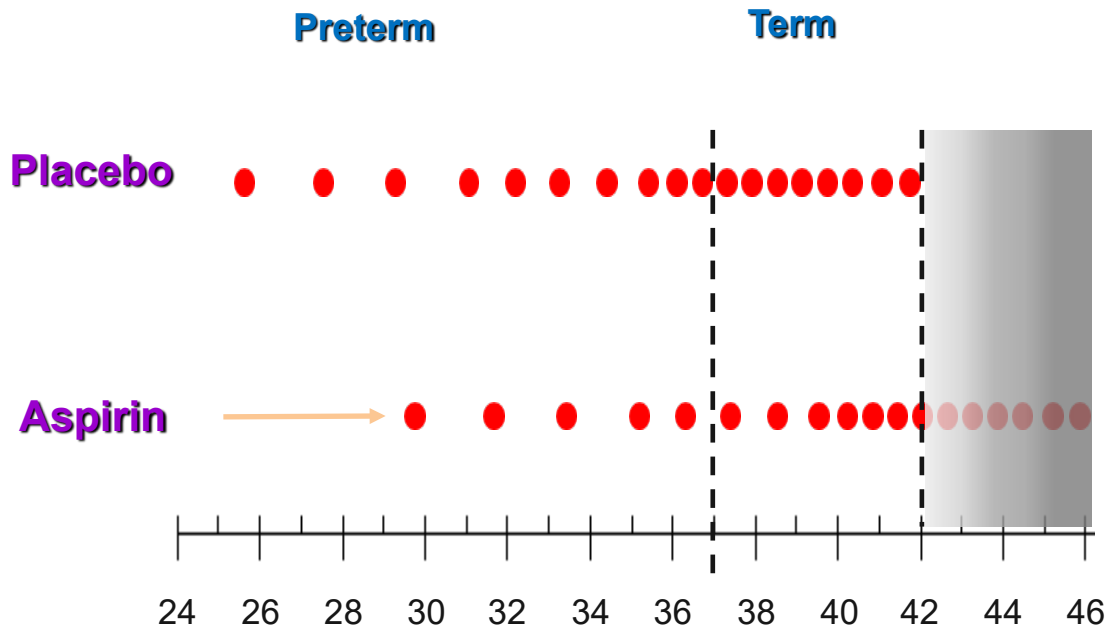


Rolnik DL, Poon LC, Nicolaides KH et al. NEJM 2017

Aspirin delays disease onset towards term



Distribution shifted to the right by 1.2 weeks



Gestational age at delivery with preeclampsia

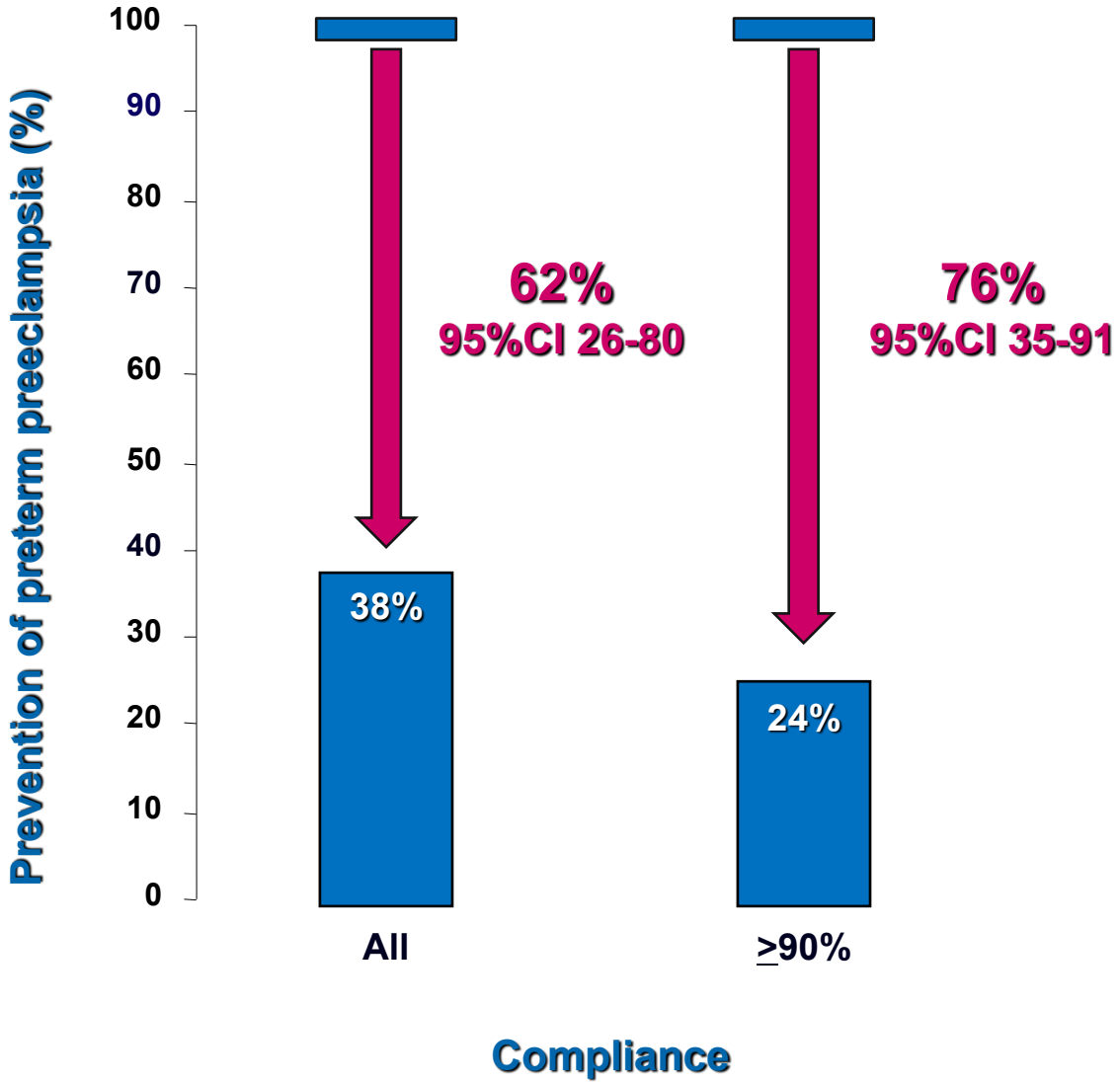
Wright D, Nicolaides KH et al. AJOG 2019

Secondary analyses of the ASPRE trial

- Effect size is maximized with good compliance
- Consistent effect of aspirin in different subgroups according to maternal risk factors, except in women chronic hypertension (no evidence of reduction of preterm preeclampsia in this subgroup)
- 20% reduction in SGA neonates
- 68% reduction in length of stay in the neonatal intensive care unit (mean reduction compared to placebo of 20.3 days), leading to a cost saving of US$ 5.6 million per 10,000 pregnancies screened (US$ 560 per pregnancy screened)

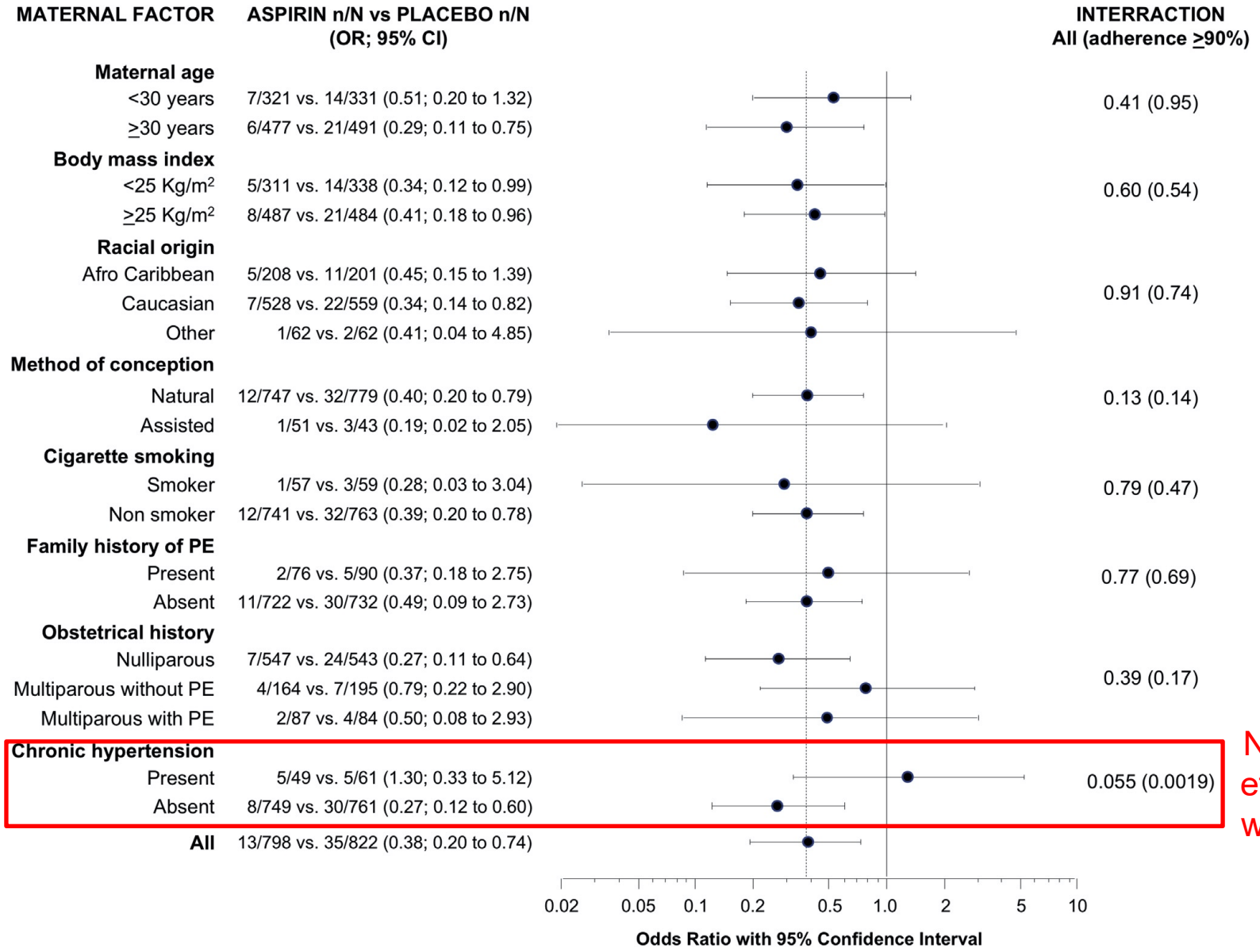
Wright D et al. AJOG 2017
Poon LC et al. AJOG 2017
Tan MY et al. UOG 2018
Wright D et al. AJOG 2018

Effect of compliance in the ASPRE trial



Wright D et al. AJOG 2017

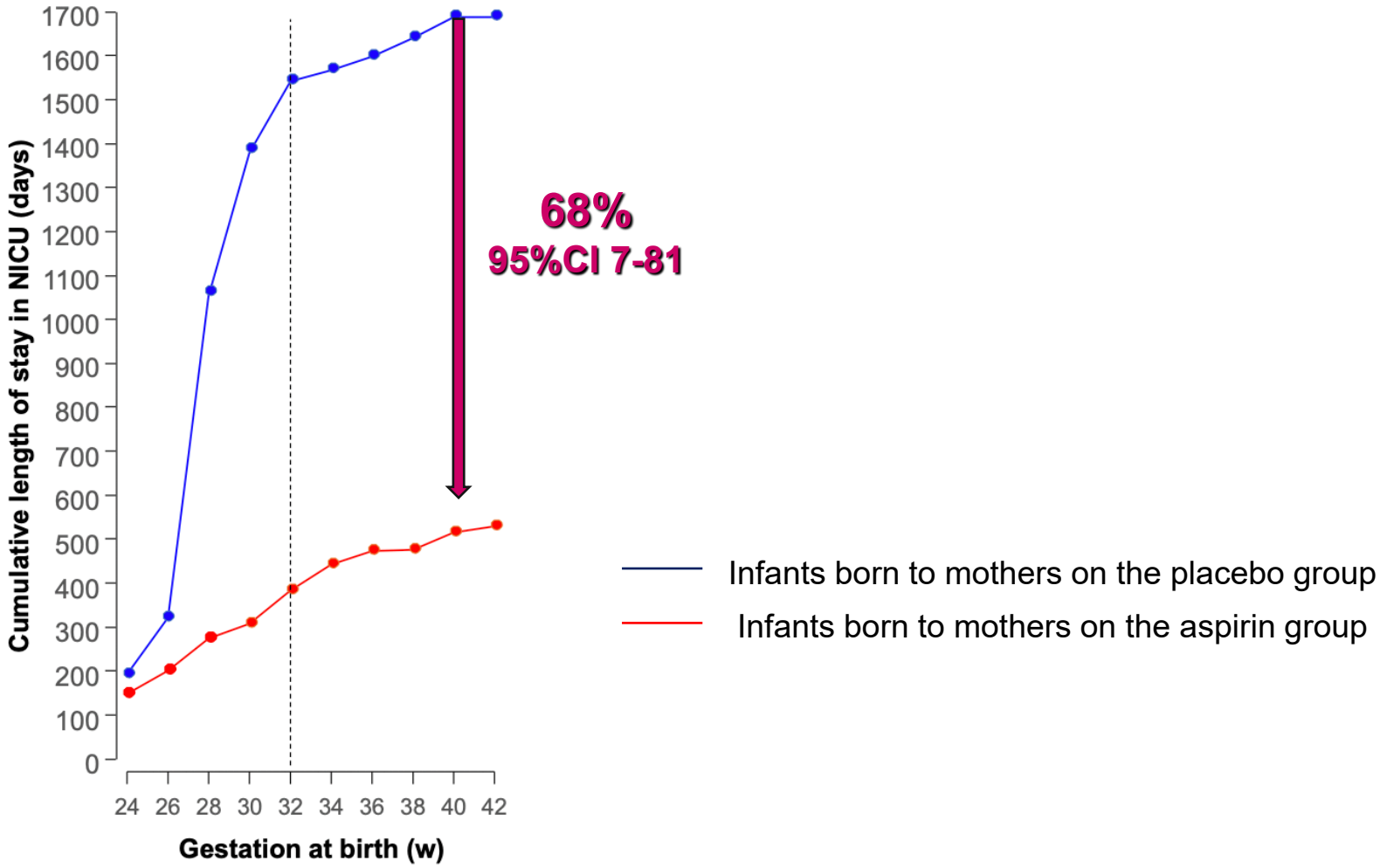
Effect of aspirin on subgroups in the ASPRE trial



No evidence of beneficial effect of aspirin in women with chronic hypertension

Poon LC et al. AJOG 2017

Effect of aspirin on cumulative length of stay in the Neonatal Intensive Care Unit



Wright D et al. AJOG 2018

Summary of aspirin effect on pregnancy outcomes

Outcome	Relative Risk (95% CI)	Number needed to treat (95% CI)
Preeclampsia < 37 weeks	0.38 (0.20 to 0.72)	38 (24 to 102)
Preeclampsia < 34 weeks	0.20 (0.06 to 0.71)	69 (41 to 233)
Birth weight < 10th percentile	0.77 (0.65 to 0.91)	16 (10 to 43)
Birth weight < 5th percentile	0.73 (0.59 to 0.91)	19 (12 to 63)
Birth weight < 3rd percentile	0.77 (0.59 to 0.99)	30 (15 to 846)
Neonatal intensive care unit > 14 days	0.34 (0.15 to 0.75)	51 (30 to 167)
Stillbirth or neonatal death	0.26 (0.11 to 0.60)	34 (22 to 80)

Safety of aspirin in pregnancy

- Not associated with an increase in congenital anomalies
- Premature closure of ductus arteriosus not reported
- Denmark study reported increased CP (OR 2.4, CI, 1.1-5.3) – reported as ‘ever used’
- 10% with GI symptoms, no other side effects
- No intracranial bleeding in neonate/increased PPH

Rolnik, DI, Nicolaides, KH, Poon, LC Prevention of preeclampsia with aspirin., Am J Obstet Gyn, Vol 226, Issue 2, S 2022, pg S1108-19.

Risk Reduction for Future Pregnancies

U.S. Preventative Services Task Force (USPSTF)

Clinical Risk Assessment for Preeclampsia and Low-dose Aspirin Administration

US Preventive Services Task Force. Aspirin Use to Prevent Preeclampsia and Related Morbidity and Mortality: US Preventive Services Task Force Recommendation Statement. JAMA. 2021;326(12):1186–1191.

Risk level	Risk factors	Recommendation to initiate LDA
High	a. History of preeclampsia b. Multifetal gestation c. Chronic hypertension d. Type 1 or 2 diabetes e. Renal disease f. Autoimmune disease (systemic lupus erythematous, antiphospholipid syndrome) g. Combinations of multiple moderate risk factors	If one or more risk factors exist, recommend low-dose aspirin
Moderate	a. Nulliparity (never having given birth) b. Obesity (body mass index > 30 kg/m^2) at first appointment c. Family history of preeclampsia (mother or sister) d. Black persons (due to social rather than biological factors) e. Lower income f. Age ≥ 35 years g. Personal history factors (e.g., low birth weight or small for gestational age, previous adverse pregnancy outcome, > 10-year pregnancy interval) h. In vitro conception	If two or more risk factors exist, recommend low-dose aspirin. If one risk factor exists, consider low-dose aspirin.
Low	Previous uncomplicated full-term delivery	Do not recommend low-dose aspirin

Prevention: Low-Dose Aspirin (LDA)

- Effective mechanism for prevention of preeclampsia in high-risk patients
  - Mainly those with a history of preeclampsia
- LDA: anti-inflammatory, anti-angiogenesis, anti-platelet
- 81-162 mg/day prophylaxis recommended for women at high risk of preeclampsia
  - Initiated between 12-28 weeks gestation (*optimally before 16 weeks*)
  - Should be continued daily until delivery

Forthcoming: MARCH OF DIMES TOOLKIT

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Best practices for prenatal and postpartum education

- Providers should assess the following prior to communicating information
  - Patient's emotional state
  - Education level
  - Health literacy
  - Cultural understanding
  - Language barriers
- Even women with higher levels of education and health literacy may have difficulty comprehending information/instructions due to the emotional impact of the illness and its treatment
- Education should be tailored to their needs

Educating patients about preeclampsia and low-dose aspirin

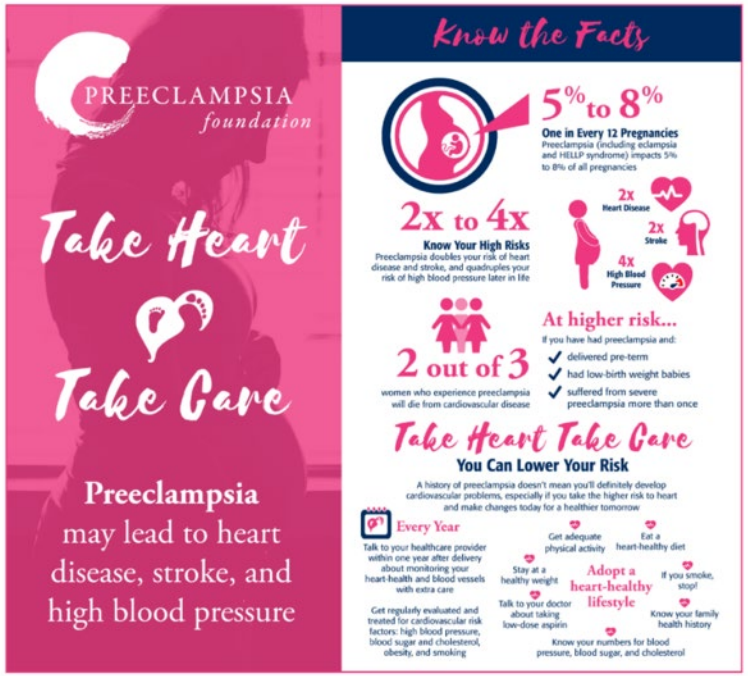
- Communication should be timely and contextualized to the patient's
  - Health literacy
  - Family structure / maternal-infant dyad
  - Cultural practices
  - Medical history and experiences
- Birthing people *and* families require ongoing education on:
  - Warning signs of serious hypertensive events and when to seek care
  - Appropriate management of high blood pressure
  - Complications of severe hypertension
  - Short-and long-term risks associated with a preeclampsia diagnosis

Used with permission from March of Dimes

Low-dose aspirin: Clinical talking points for women

- For some women, taking low-dose aspirin during pregnancy may help reduce the risk for serious problems for you and your baby, like preeclampsia and premature birth.
- Preeclampsia is when you have high blood pressure and signs that some of your organs, like your kidneys and liver, may not be working right. Preeclampsia can happen after the 20th week of pregnancy or right after pregnancy.
- If not treated, preeclampsia can cause serious problems for you and your baby, including premature birth (before 37 weeks of pregnancy). Babies born early may have more health problems than babies born on time.
- There are several factors which increase your risk for developing preeclampsia.
- One way to reduce the chance that you get preeclampsia is for you to take a low-dose aspirin every day starting at 12 weeks of gestation.
- Low-dose aspirin also is called prenatal aspirin, baby aspirin, or 81 mg (milligrams) aspirin.
- You can buy low-dose aspirin over-the-counter, or your provider can write a prescription for aspirin for you so that you can get it at low cost or no cost, depending on your health insurance.
- Low-dose aspirin is safe during pregnancy and won't harm you or your baby.
- Setting a calendar alert on your cell phone can be an easy way to remember to take your pill each day before bedtime.
- Go to all your prenatal care checkups, even if you're feeling fine. You can have preeclampsia and not know it.
- What questions or concerns do you have about taking low-dose aspirin during your pregnancy?

Preeclampsia Patient Education Materials



www.preeclampsia.org

Checklist 5: Education at discharge for postpartum birthing people with HDP

Goal	☐ Promote safety and vigilance for postpartum women with hypertensive disorders of pregnancy (HDP) during the time between hospital discharge and first follow-up visit in 3-7 days.
Educate and Discuss	☐ Explain that HDP can progress to preeclampsia with severe features, eclampsia, or HELLP syndrome during the days and weeks after birth. ☐ Provide verbal and written explanation of signs and symptoms of preeclampsia complications prior to discharge. ☐ Emphasize urgency of symptoms and importance of calling provider/hospital immediately during this time of "watchful waiting."
Direction	☐ Send patient home with blood pressure cuff and convey simple instructions for checking accurate blood pressure. ☐ Resource for clinicians/ hospitals: Preeclampsia Foundation's the Cuff Kit™ provides blood pressure cuffs to women. ☐ Provide additional resources: easy to follow accurate blood pressure measurement instructions available at: https://www.preeclampsia.org/accurate-blood-pressure
Communicate and Connect	☐ Use simple terms and maintain eye contact. ☐ Confirm whether patient understands signs and symptoms by asking her to repeat back signs and symptoms. ☐ Include a key family member in discharge education. ☐ Call interpreter or interpretation services for language barriers. ☐ Provide adequate time to answer questions.
Emergency Contact	☐ Provide emergency telephone number. ☐ Make sure patient knows location of L&D/ED to go to in an emergency . ☐ Inform patient what to say to administrative staff/answering service: *"I am having symptoms of preeclampsia and my provider told me to call and ask to be seen right away when I experience these symptoms. My baby was born <insert date here>."*

HDP Postpartum Warning Signs

- Severe headache
- Stomach Pain
- Swelling of the hands and face
- Seeing spots
  (or other vision changes)
- Shortness of breath
- Nausea or vomiting

Administrative Staff Education and Training

- Staff needs to be able to provide appropriate and timely instructions.
- Because of the complexity and wide range of presentations of HDP, a simple instruction is often the best choice:

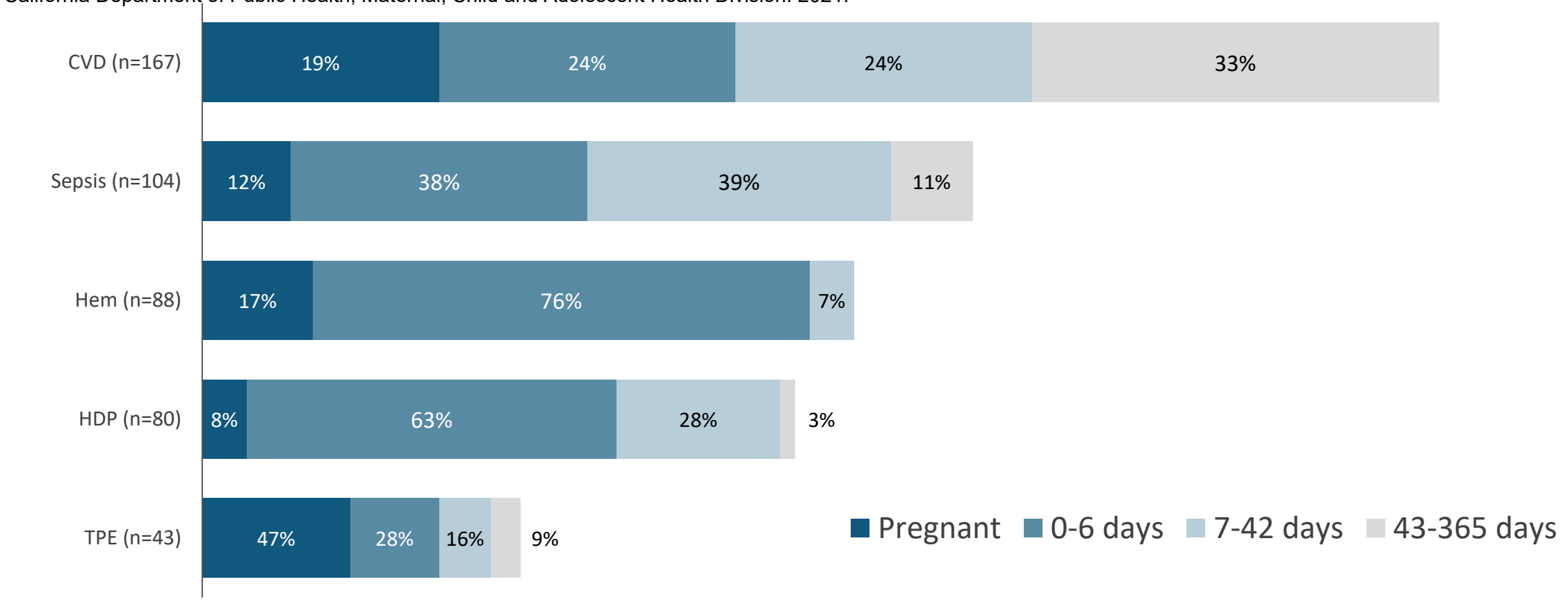
"Please go immediately to labor and delivery / emergency room and let them know you are pregnant or recently gave birth and I will phone to alert them you are coming."

Postpartum follow-up for patients diagnosed with preeclampsia

- The postpartum period should continue to be regarded as a high-risk period for women, especially women with HDP.
- Preeclampsia can develop more than 48 hours after delivery, which for many patients, is after postpartum discharge.
- Home BP cuffs
- Outpatient follow-up schedule
  - Patients treated with antihypertensives during hospitalization should be seen within 3-7 days of discharge.
  - Patients diagnosed with hypertension but *not treated* with antihypertensives should be seen within 7-14 days of discharge.

Pregnancy-Related Deaths by Cause and Timing to Death, California 2008-2016 (N=608)

CA-PMSS Surveillance Report: Pregnancy-Related Deaths in California, 2008-2016. Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2021.



Pregnancy-related deaths include deaths within a year of pregnancy from causes related to or aggravated by the pregnancy or its management, as determined by expert committee review.

Diagnosing delayed postpartum preeclampsia

Delayed postpartum preeclampsia is defined as hypertension that begins ≥ 2 days after childbirth in those who did not previously have an HDP

- **Newly elevated BP in previously normotensive, postpartum women should not be attributed to lack of sleep, stress, or pain.**
- Diagnostic criteria are the same as for preeclampsia prior to delivery.

ACOG Diagnostic Criteria for Preeclampsia in Pregnancy/Postpartum

Gestational Hypertension and Preeclampsia, ACOG Practice Bulletin #222, 2020

Blood Pressure AND Proteinuria

- Systolic blood pressure of ≥ 140 mm Hg OR diastolic blood pressure of ≥ 90 mm Hg on two occasions at least 4 hours apart after 20 weeks of gestation in a woman with a previously normal blood pressure

OR

- Systolic blood pressure of 160 mm Hg or more or diastolic blood pressure of 110 mm Hg or more. (Confirmed within a short interval [15 minutes] to facilitate timely hypertensive therapy.)

- 300 mg or more per 24-hour urine collection

OR

- Protein/creatinine ratio of 0.3 or more

OR

- Dipstick reading of 2+ (used only if other quantitative methods not available)

Note: The **total** amount of proteinuria > 5g in 24 hours has been eliminated from the diagnosis of preeclampsia with severe features as an indication for immediate delivery

Evaluating postpartum preeclampsia

- Newly elevated BP ≥ 140/90 mm Hg or symptoms considered to be severe
  - Serial surveillance of BP
  - Complete blood count (CBC), serum creatinine, ALT, AST (uric acid opt.)
  - Catheterized urine specimen for urine: protein creatinine ratio
- Depending on signs/symptoms, further evaluation may be warranted
  - RUQ US for persistent abdominal pain
  - CT and/or MRI of the brain for persistent headache or other neurologic symptoms

An elevated BP should be evaluated thoroughly and no differently than in the antenatal setting; new-onset hypertension should be assumed to be preeclampsia until proven otherwise.

Treating postpartum preeclampsia after discharge

- Decision to treat with magnesium is controversial
  - Risk of seizure declines with time since delivery
  - Consider for patients:
    - with new-onset severe features postpartum who did not previously receive magnesium sulfate
    - who re-present with severe features after a period of time without severe features (e.g., several days)
  - This recommendation should be based on expert opinion, and treatment should be individualized.
- Risk of stroke from severe hypertension is unchanged in the postpartum state and must be addressed with the same urgency as with ante- and intrapartum patients

Postpartum hypertension/ persistent hypertension treatment

- Risk factors associated with the prolonged requirement of antihypertensive therapy
  - Multiparity
  - Obesity
  - Dx of preeclampsia with severe features based on BP criteria
  - Hx chronic HTN
- Labetalol and Nifedipine most commonly prescribed
- Goal BP 130-150 mm Hg systolic/80-100 mm Hg diastolic

Long-Term Risk after Hypertensive Disorders of Pregnancy

- Patients with a history of HDP during pregnancy or the postpartum period are at increased risk for:
  - **Pulmonary edema**
  - **Cardiomyopathy**
- Those with low oxygen saturation, shortness of breath, or dyspnea should be evaluated and treated
  - BNP, EKG, CXR, cardiac echo, cardiology consultation
- Patients should be counseled that HDP increases risk of future cardiovascular disease and their primary care provider should be made aware of their pregnancy history.

American Heart Association (AHA) prevention of CVD guidelines

- Implement follow-up evaluations for all with a Hx of preeclampsia /eclampsia between 6-12 months postpartum
- Share information and resources with women and their families
- A history of preeclampsia/eclampsia should be elicited for women who are past child-bearing age, as this history is an important indicator of risk throughout the life cycle.
- Those with a Hx of an HDP need to be referred to primary care providers or cardiologists for annual visits to carefully monitor their health.

Prenatal Low-dose Aspirin Pilot Project

- Project Goals:
  - Develop, test, and refine a process to:
    - Improve patient understanding of preeclampsia and the role of low-dose aspirin in the prevention of preeclampsia and subsequent preterm birth
    - Increase screening and prescription of low-dose aspirin by providers among those patients eligible
- Integral Steps:
  - Develop Key Partnerships
  - Gather Community Wisdom
  - Establish Data Systems

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Thank you!

For More Information and to Download the Toolkit

www.CMQCC.org/toolkits

Contact us:

info@cmqcc.org


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Supplemental Slides

Laboratory Evaluation of Preeclampsia

- Complete blood count (CBC) with platelet count
- Aspartate aminotransferase (AST)
- Alanine aminotransferase (ALT)
- Lactate Dehydrogenase (LDH)
- Creatinine
- Bilirubin
- Glucose
- Comprehensive metabolic panel (CMP)
- Uric acid (optional)

For patients with acute abdominal pain add:
Serum amylase, lipase, and ammonia

Acute Treatment Algorithm

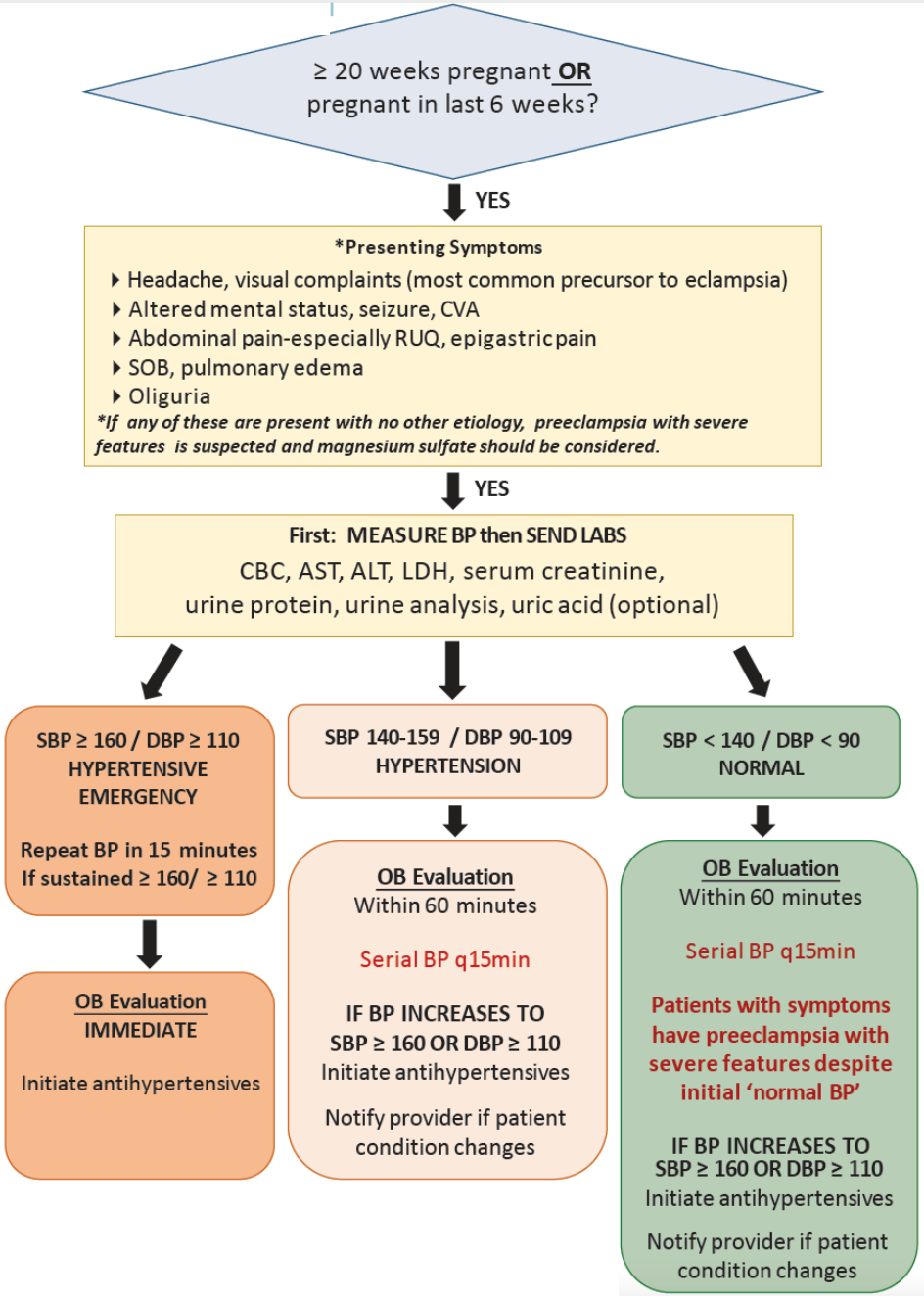
Evaluation and Treatment of Antepartum and Postpartum Preeclampsia/Eclampsia

Part 1: Diagnostic Algorithm

Preeclampsia with severe features:

- SBP ≥2160 mm Hg or DBP ≥ 110 mm Hg on 2 occasions at least 4 hours apart (unless antihypertensive therapy is initiated before this time)
- Thrombocytopenia
- Impaired liver function that is not accounted for by alternative diagnoses indicated by abnormally elevated liver enzymes or by severe persistent right upper quadrant or epigastric pain
- Renal insufficiency
- Pulmonary edema
- New-onset headache unresponsive to medication and not accounted for by alternative diagnoses
- Visual disturbances

ACOG Practice Bulletin 222, 2020



Acute Treatment Algorithm

Evaluation and Treatment of Antepartum and Postpartum Preeclampsia/Eclampsia

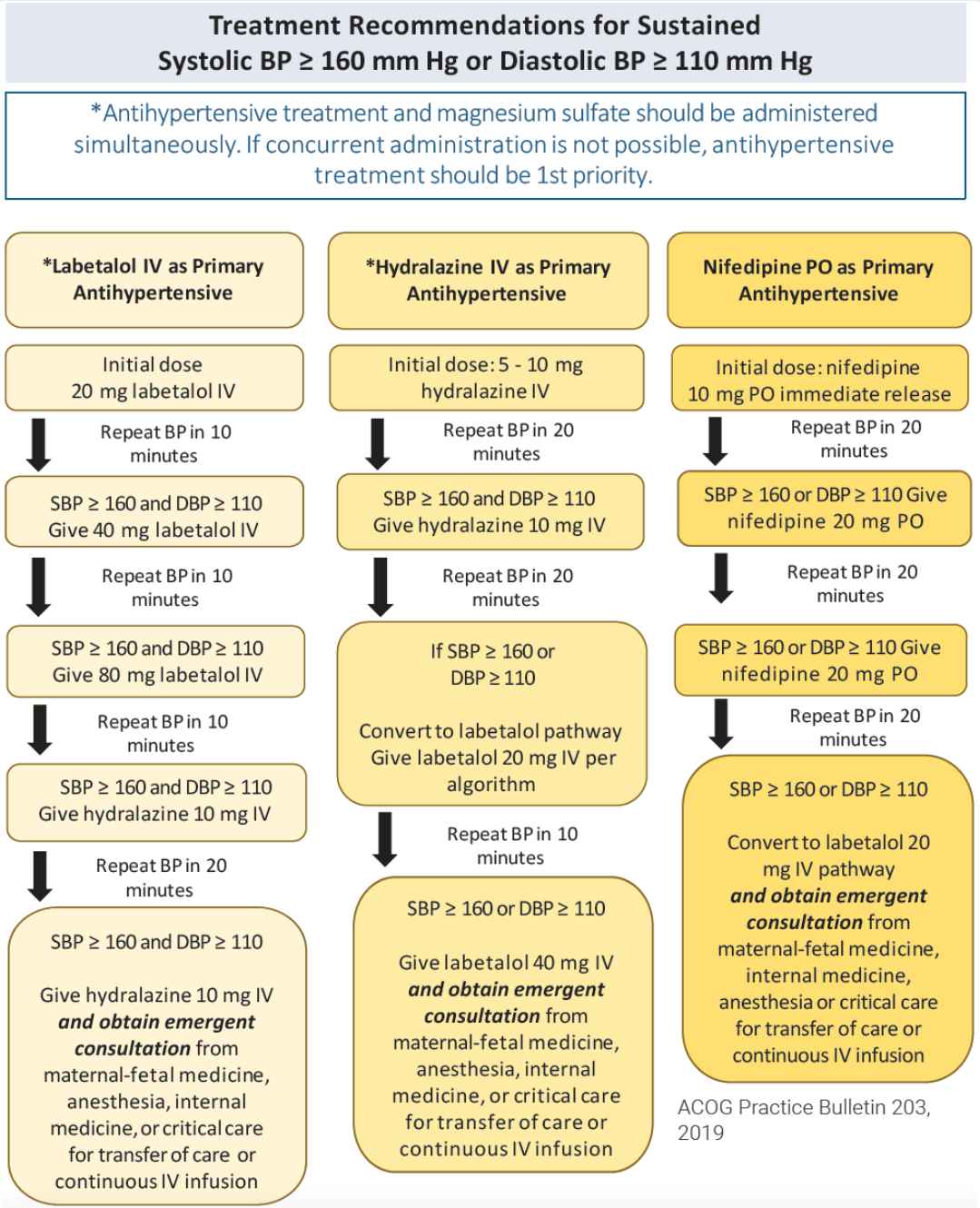
Part 2: Antihypertensive Treatment Algorithm for Hypertensive Emergencies

Target BP: 130-150/80-100 mm Hg

Once BP threshold is achieved:

- Q10 min for 1 hr
- Q15 min for 1 hr
- Q30 min for 1 hr
- Q1 hr for 4 hrs

*Intravenous hydralazine or labetalol should be given over 2 minutes. In the presence of sinus bradycardia or a history of asthma, hydralazine or nifedipine are preferred as initial agents. If maternal HR > 110, labetalol is preferred.



ACOG Practice Bulletin 203, 2019

Late Postpartum Eclampsia

- > 48 hours following delivery, up to 6 weeks PP
- Accounts for approximately 26% of cases of eclampsia
- 78% had no antepartum hypertensive diagnosis
- The magnitude of blood pressure elevation does not appear to be predictive of eclampsia
- The most common presenting symptom was headache, occurring in ~ 70% of patients
  - Other prodromal symptoms included shortness of breath, blurred vision, nausea, vomiting, edema, neurological deficit, and epigastric pain

Al-Safi Z, Imudia A, Filetti L, et al. Obstet Gynecol. 2011;118(5):1102-1107.