Cardiovascular Diseases in Pregnancy and Postpartum

ACOG PRACTICE BULLETIN #212
Pregnancy and Heart Disease

Physiologic Changes in Pregnancy That Affect Cardiovascular Stress

Pregnancy is a natural stress test because the cardiovascular system undergoes structural and hemodynamic adaptations to sustain a high-volume load. An understanding of these physiologic changes is essential for health care providers.

What are those Normal Physiological Changes in Pregnancy?

As a Review
Normal Physiological changes in pregnancy

Decreased vascular resistance and peripheral vasodilation

- Decreased systemic blood pressure and mean arterial pressures [MAP]
- Peripheral edema
- Allows for adequate perfusion to end organs- The placenta is an end organ!

Increased blood volume (plasma) and hemodilution

- Dilutional anemia of pregnancy – increase in intravascular volume – Plasma is increased more than red blood cells

Increased cardiac output

- Slight increased in HR

Vascular remodeling occurs

- Spiral arteries of the uterus widen in diameter
- Vessel walls become thinner

(LOWDERMILK ET AL., 2024)

Risk Factors for Cardiovascular Disease Across the Maternal Care Continuum:

1. Race and ethnicity – non-Hispanic black women have a 3.4 times increase as compared to other ethnicities
2. Age – over 40 years of age increases maternal death from cardiac disease by 30 times
3. Hypertension in pregnancy
4. Obesity – prepregnancy especially if associated with sleep apnea

Cardiovascular Disease in Relation to Pregnancy

- Cardiovascular pathophysiologic changes of pregnancy persist for weeks postpartum.
- Normally, the heart compensates for the increased workload allowing pregnancy, labor, and the postpartum period to be well tolerated.
- If myocardial disease develops, valvular disease exists, or a congenital heart defect is present, *cardiac decompensation* may occur.

(CMQCC, 2017; Lowdermilk et al., 2024

Cardiovascular Disease

- The first presentation of cardiovascular disease may be during pregnancy or in the early postpartum period.
- ***The highest risk period for a preexisting cardiac condition to manifest is generally in the late second trimester, i.e., 24-28 weeks, or in the postpartum period.***
- Healthcare providers should maintain a high index of suspicion for underlying cardiovascular disease when a woman presents with symptoms, signs, and risk factors concerning for heart disease for as long five months postpartum.

(cmqcc, 2017)

CVD Signs and Symptoms

- Extreme fatigue
- Extreme swelling
- Weight gain
- Dyspnea
- Mild orthopnea - how many pillows does she prop with at night?
- Tachypnea
- Persistent cough
- Asthma unresponsive to therapy
- Palpitations
- Dizziness
- Syncope
- Tachycardia
- Chest pain

(CMQCC, 2017)

Cardinal Rule.....

When a woman presents to the unit and or emergency department who is pregnant or has been pregnant within the last year with any of the following symptoms:

- Shortness of Breath – Unable to complete a sentence without taking a breath
- Extreme fatigue – Example- activities of daily living which are not influenced by lack of sleep from taking care of a newborn
- Inability to lie flat when resting – Example- using 4 pillows or sleeping in a recliner to be able to breathe adequately
- Chest pain

Should Prompt Concern and Immediate Assessment of the Patient

Concerning Assessments

Vital Sign Changes:

- Resting HR $\geq$ 110 bpm
- Systolic BP $\geq$ 140 mmHg
- Respiratory rate $\geq$ 24
- O2 sats $\leq$ 95%

Assessment:

- Murmur
- Crackles in lung bases

(CMQCC, 2017; Hameed et al., 2015)

Diagnosis of Cardiovascular Disease

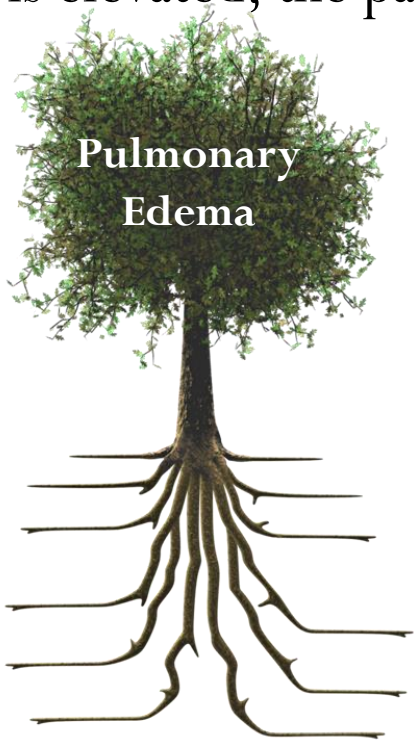
- EKG
- BNP
- Echocardiogram
  - If BNP is elevated
- Chest X-ray
  - Be aware that pulmonary edema or changes on a Chest X-ray may be misinterpreted if the root cause is not investigated and pregnancy conditions are not considered. A new diagnosis of asthma is highly unusual for an adult patient
    - This is when a consult with Maternal Fetal Medicine can be beneficial

What is a BNP

- BNP is a neurohormone secreted predominantly by the cardiac ventricles in response to volume expansion or pressure overload
- Normal levels
  - CMQCC considers anything <100 pg/ml is normal
  - Cardiologists typically use >500 pg/ml as indicative of heart failure
    - BNP levels are higher predictor value of cardiomegaly compared to chest x ray
      - CMQCC (2017) pg. 13

What if the BNP is Normal.....

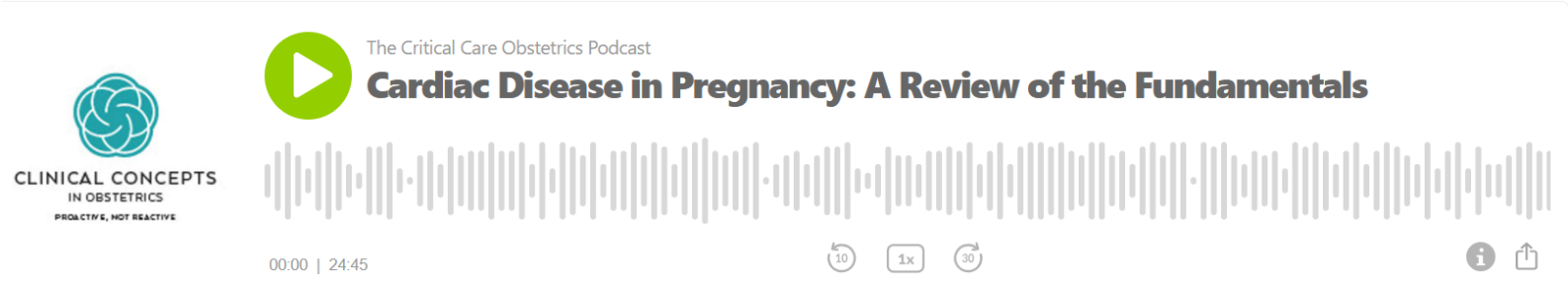
- If the pregnant or post-partum patient has signs of pulmonary edema and the BNP is normal, suggesting lack of congestive heart failure, or pump failure, look for the **ROOT** cause and in this patient population, consider non-cardiogenic pulmonary edema.
  - This condition can be found in women who have hypertensive disorders in pregnancy where the vessels are "leaky" and fluid escapes from within the confines of the vessels and escapes to surrounding tissues. Therefore, even if the BP is elevated, the patient may have decreased intravascular volume.



Is the root cause of pulmonary edema from pump failure of the heart (cardiogenic) or leaky vessels related to hypertensive disorders of pregnancy?????

A Great Podcast

For an in-depth, easy listening explanation of Cardiac Disease in Pregnancy please access the following Podcasts:
https://www.clinicalconceptsinob.com/the-critical-care-obstetrics-podcast/



Prompts for further assessment
CVD in Pregnancy and Postpartum

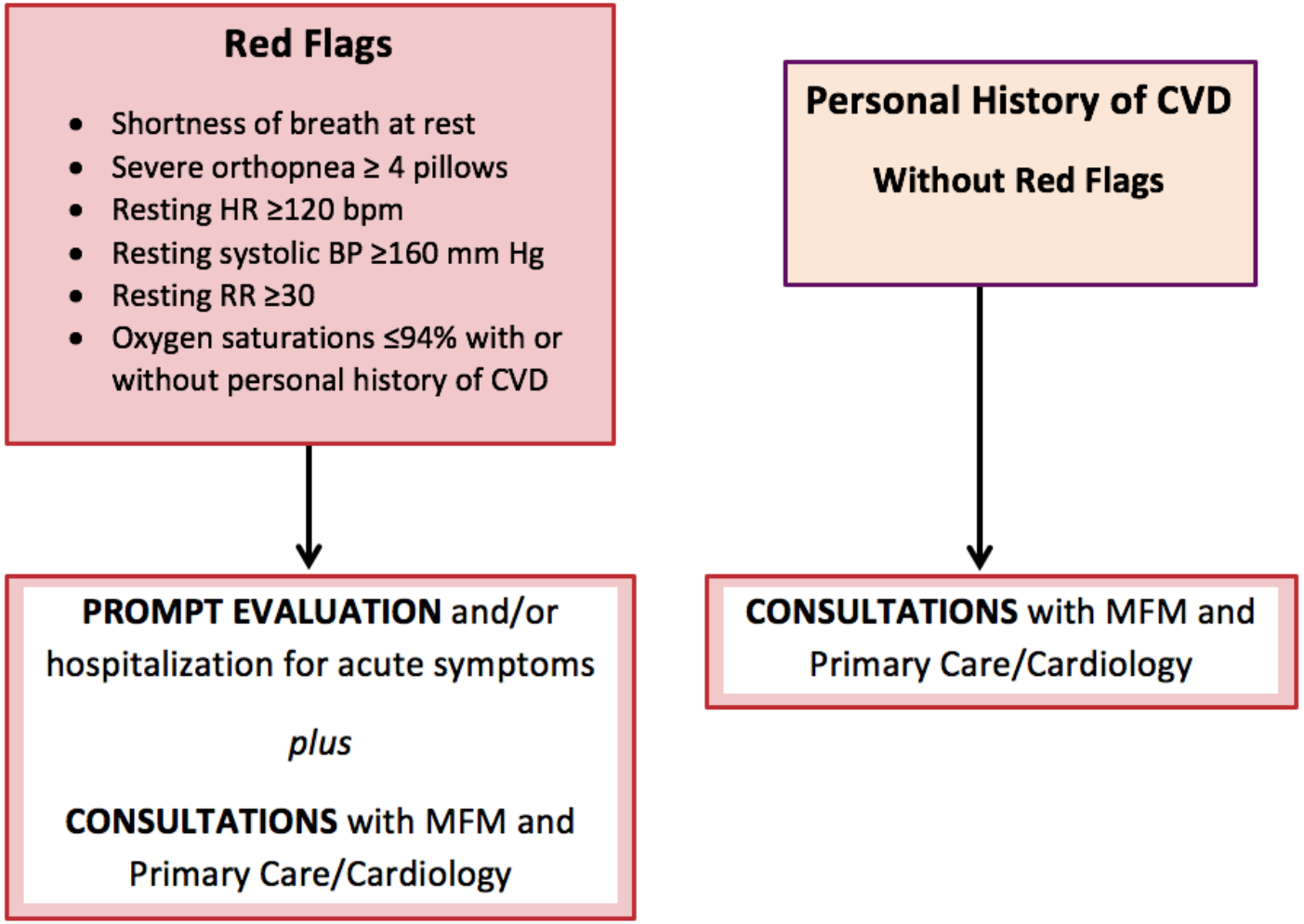
- When a pregnant or postpartum woman presents with complaints of shortness of breath, ask if she has experienced:
  - Worsened level of exercise tolerance
  - Difficulty performing activities of daily living; Unexpected fatigue
  - Symptoms that are deteriorating, especially chest pain, palpitations, or dizziness
  - New onset of cough or wheezing
  - Leg edema and if it is improving or deteriorating
  - Inability to lay flat; if this is a change; how many pillows she uses to sleep
  - Failure to lose weight or unusual weight gain, and how much
  - A history of cardiac or pulmonary conditions
  - A history of substance abuse and/or cigarette use
  - Or has been seen by other providers or in other Emergency Departments for these complaints.
    - Especially if she is post partum

(CMQCC, 2017)

Normal Pregnancy/Postpartum	Cardiac Disease
Chest discomfort	Chest discomfort with myocardial ischemia
Dyspnea	Severe dyspnea limiting activity; paroxysmal nocturnal dyspnea
Orthopnea	Progressive orthopnea
Palpitations	Cardia arrhythmia
Fatigue	Fatigue with chest pain and syncope
Dizzy spells	Dizziness in conjunction with other signs and symptoms
Syncope	Syncope with exertion/activity
Systolic murmurs	Loud, harsh, systolic murmurs, diastolic murmurs, grade III intensity
Dependent edema	Both dependent and nondependent edema
Rales in lower lungs	Rales that don't clear with deep inspiration; hemoptysis
Visible neck veins	Persistent neck vein distention
Cardiomegaly	Cardiomegaly plus hepatomegaly and ascites

(Mattson & Smith, 2016)

CVD Assessment Algorithm
For Pregnant and Postpartum Women



CARDIOVASCULAR DISEASE ASSESSMENT IN PREGNANT and POSTPARTUM WOMEN

(No Red Flags and/or no personal history of CVD, and hemodynamically stable)

SYMPTOMS

*NYHA class > II

Suggestive of Heart Failure:
- Dyspnea
- Mild orthopnea
- Tachypnea
- Asthma unresponsive to therapy

Suggestive of Arrhythmia:
- Palpitations
- Dizziness/syncope

Suggestive of Coronary Artery Disease:
- Chest pain
- Dyspnea

VITAL SIGNS
- Resting HR ≥110 bpm
- Systolic BP ≥140 mm Hg
- RR ≥24
- Oxygen sat ≤96%

RISK FACTORS
- Age ≥40 years
- African American
- Pre-pregnancy obesity (BMI ≥35)
- Pre-existing diabetes
- Hypertension
- Substance use *(nicotine, cocaine, alcohol, methamphetamines)*
- History of chemotherapy

****PHYSICAL EXAM**

ABNORMAL FINDINGS

Heart: Loud murmur or

Lung: Basilar crackles

NO

YES

≥ 1 Symptom + ≥ 1 Vital Signs Abnormal + ≥ 1 Risk Factor or

ANY COMBINATION ADDING TO ≥ 4

Consultation indicated:

MFM *and* Primary Care/Cardiology

Obtain: **EKG and BNP**
- **Echocardiogram +/- CXR** if HF or valve disease is suspected, or if the BNP levels are elevated
- 24 hour Holter monitor, if arrhythmia suspected
- Referral to cardiologist for possible treadmill echo vs. CTA vs. alternative testing if postpartum

Consider: **CXR**, **CBC**, Comprehensive metabolic profile, Arterial blood gas, Drug screen, TSH, etc.

Follow-up within one week

Results abnormal

CVD highly suspected

Results negative

Signs and symptoms resolved

Reassurance and routine follow-up

Key points

Symptoms related to physiologic changes of pregnancy should be improving in the postpartum period.

Any visits to Emergency Department for dyspnea should raise suspicion for cardiovascular disease.

Women of childbearing age should be questioned about recent pregnancies, in addition to their last menstrual period (LMP).

(CMQCC, 2017)

Key points

Postpartum dyspnea or new onset cough is concerning for cardiovascular disease

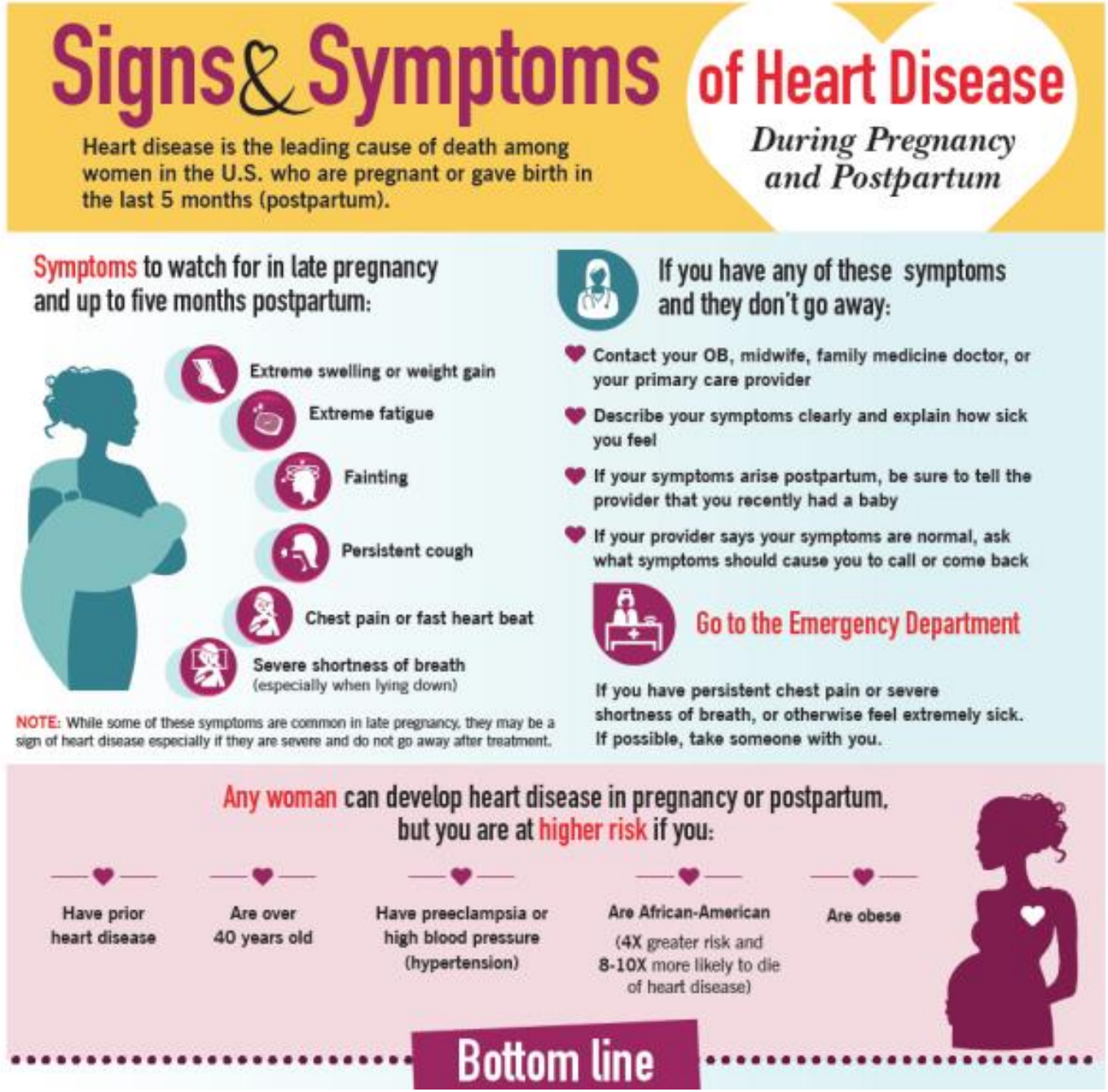
New onset asthma is rare in adults

Bilateral crackles on lung examination are most likely associated with Congestive Heart Failure (CHF)

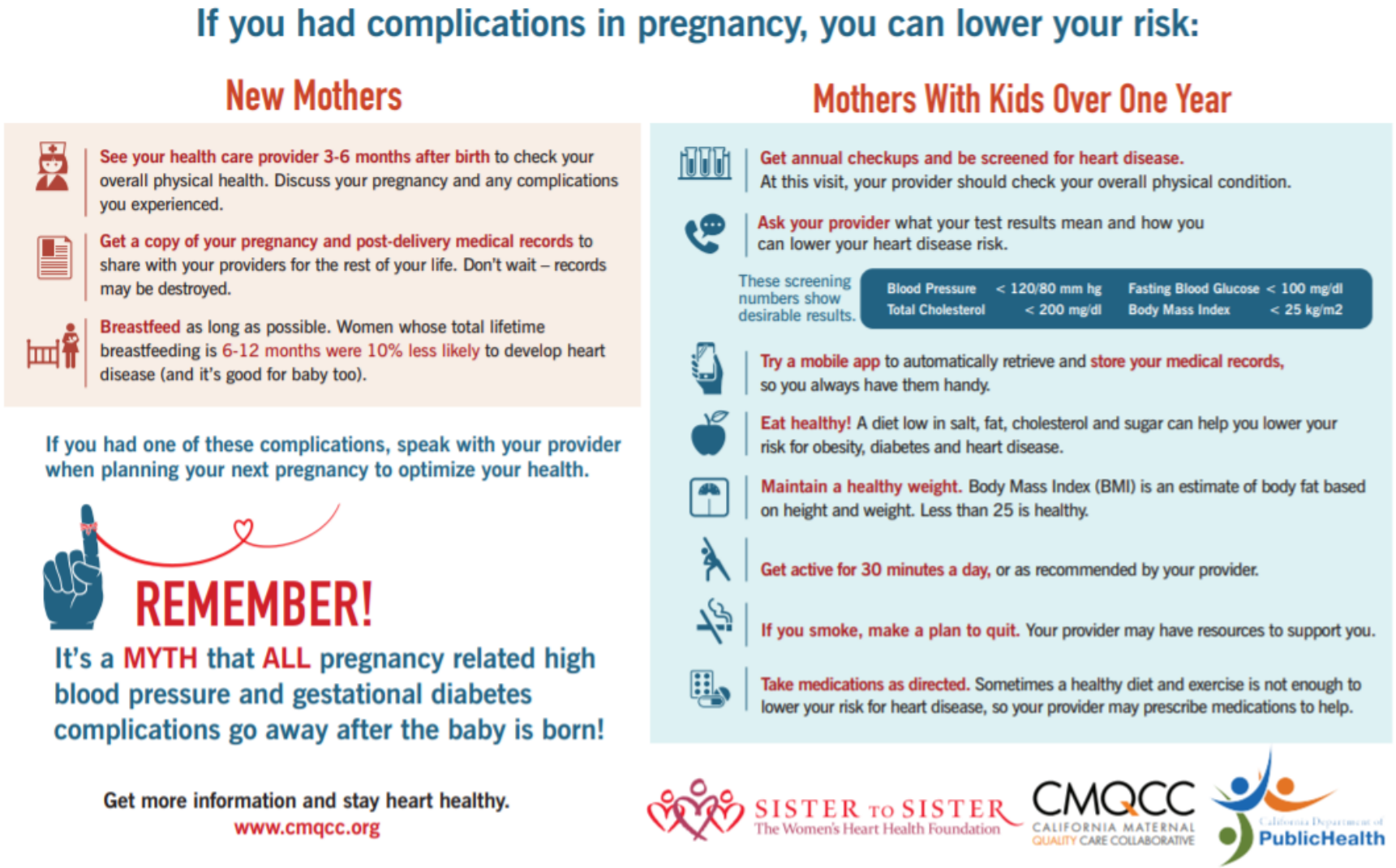
Improvement of dyspnea with bronchodilators does not confirm the diagnosis of asthma, as CHF may also improve with bronchodilators. Likewise, a lack of response to bronchodilators should prompt the entertainment of a diagnosis other than asthma.

(CMQCC, 2017)

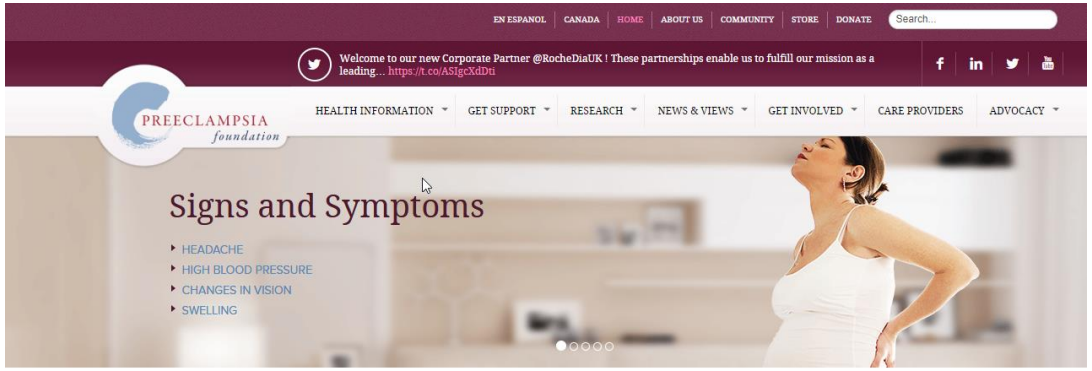
CVD & Future Risk Discharge Education

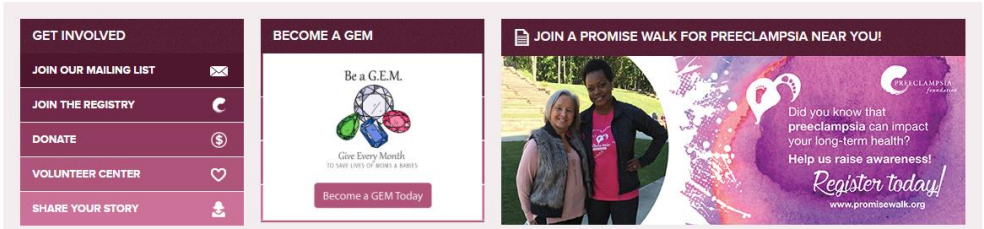


LONG TERM CONSEQUENCES OF PREECLAMPSIA

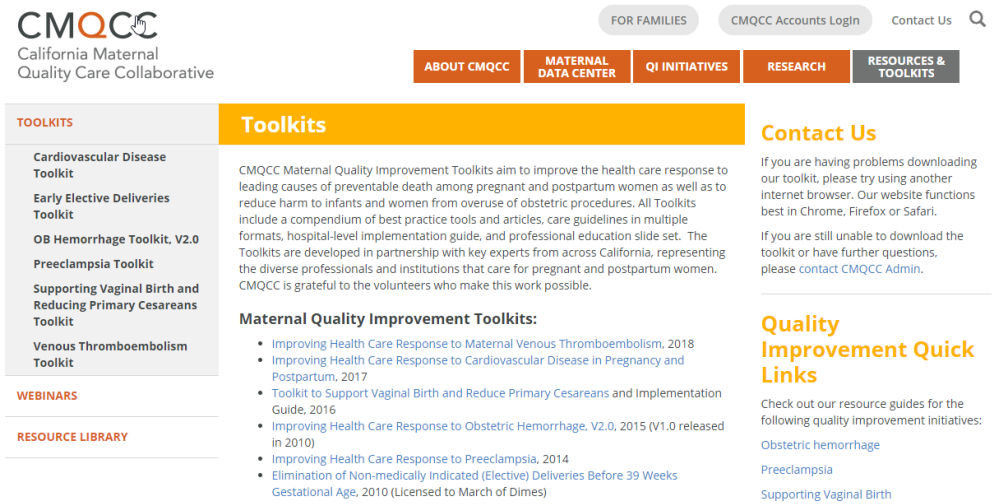


(CMQCC, 2017)





Resources



COUNCIL ON PATIENT SAFETY IN WOMEN'S HEALTH CARE

safe health care for every woman

Dissolved in 2021 and has been replaced by ***AIM***

ALLIANCE FOR INNOVATION ON MATERNAL HEALTH

AIM

Patient's Story

Peripartum cardiomyopathy survivor, Zuleyma Santos, shares her story of survival and recovery (youtube.com)

Through Education, Recognition and Listening to Our Patients!

MHS CUSTOM PATIENT EDUCATION

Methodist Health System

Preeclampsia

Preeclampsia is a serious condition related to high blood pressure. It can develop during pregnancy and/or postpartum (post-delivery). Regardless of preexisting health conditions, pregnant women or those who have recently had a baby can develop this condition. Preeclampsia can be mild or severe, resulting in health risks for you and your baby if you are pregnant.

What are the risks?

If preeclampsia is untreated, you are at an increased risk of a seizure, stroke, organ damage or death. During pregnancy, you are at risk of premature delivery.

After Delivery

Even if you were not diagnosed with preeclampsia during pregnancy, you are still at risk of developing this condition for up to 6 weeks postpartum.

Signs and symptoms of preeclampsia

- High blood pressure (greater than **140/90**)
- Headaches (unrelieved by over the counter medication)
- Stomach pain - especially on your right side
- Vision problems (blurry, seeing spots/sparkles)
- Nausea and vomiting
- Increased swelling in hands and face
- Rapid weight gain (more than 3 pounds in 3 days).

Treatment for Preeclampsia

During pregnancy and postpartum, preeclampsia may be treated with bed rest and/or medications. Magnesium sulfate may be given through an IV in the hospital to prevent seizures before or after delivery.

What to expect after discharge?

- Follow up with your provider 3-7 days postpartum.
- You may need to see your provider more often over the next several weeks.
- It is important to keep all follow-up appointments.
- If you are prescribed medication, take it exactly as directed. Your provider will tell you when you can stop taking the medication.
- Weigh yourself at the same time each day. If you have gained more than 3 pounds in 3 days, contact your provider. Take the record of your daily weights with you to your appointments.
- You may be asked to monitor your blood pressure at home. Call your provider if your top blood pressure number (systolic) is equal to or greater than 140 or your bottom blood pressure number (diastolic) is equal to or greater than 90.

When to Call your Doctor

- If you have any signs or symptoms of preeclampsia, contact your OB provider immediately.

Recognizing these warning signs could save your life.

Go to the Emergency Department

- If you cannot reach your OB provider and you are experiencing signs or symptoms of preeclampsia.
- If your top blood pressure number (systolic) is equal to or greater than 160 or your bottom blood pressure number (diastolic) is equal to or greater than 110.
- You are experiencing shortness of breath.
- You have had a seizure.

Tips for talking with your provider:

- Clearly describe your symptoms and explain how sick you feel.
- Report how long you have had the symptoms.
- Tell them what makes the symptoms better or worse.
- Let them know if you have been seen for this issue in the past.
- If your symptoms occur postpartum, make sure you tell the provider you have recently had a baby.
- If the provider feels your symptoms do not require treatment at this time; ask when you should call again or return to the clinic/hospital for evaluation.

Methodist Health System

Pregnancy and Heart Disease

Women who develop complications during pregnancy have a higher risk of developing heart disease later in life. All pregnancy related complications may not go away after the baby is born.

Pregnancy Complications that Increase the Risk of Heart Disease

- **High blood pressure during pregnancy (such as gestational hypertension, preeclampsia, eclampsia, and HELLP syndrome)** increases the future risk of heart disease, chronic hypertension, heart failure, stroke, and kidney disease. .
- **Gestational diabetes during pregnancy** increases the risk of developing Type II diabetes. Gestational diabetes is also linked to increased cardiovascular risk later in life.
- **Preterm birth at less than 37 weeks and preeclampsia** significantly increases the risk of heart disease.

How to Protect Your Heart Post-Baby

- Discuss your pregnancy history
- Schedule an appointment with your primary health care provider 3 months after birth to check your overall health. This is in addition to your routine OB postpartum visit.
- Get a copy of your medical records.
- Talk to your health care provider about any pregnancy complications you had and how they may affect your heart.
- Talk to your provider about ways to prevent complications in future pregnancies.

Be proactive with screenings

- Schedule a yearly physical with your primary care provider.
- Get screened for heart disease at each yearly physical.
- Common heart disease screening includes blood pressure reading, fasting blood sugar, total cholesterol, and body mass index (BMI).
- Ask your health care provider to explain your test results and ask how you can lower your risk of heart disease.

Live a healthy lifestyle

- Eat healthy. A diet low in salt, fat, cholesterol, and sugar will help lower your future health risks.
- Exercise. Be active for 30 minutes each day. A walk a day goes a long way.
- Maintain a healthy body weight. A body mass index (BMI) of less than 25 will decrease your health risks.
- Don't smoke. If you smoke ask your health care provider about resources to help you quit.
- Take prescribed medications as instructed. Sometimes medications are needed to lower your risk of heart disease, in combination with a healthy diet and exercise.

ACOG COMMITTEE OPINION #736"OPTIMIZING POST-PARTUM CARE"

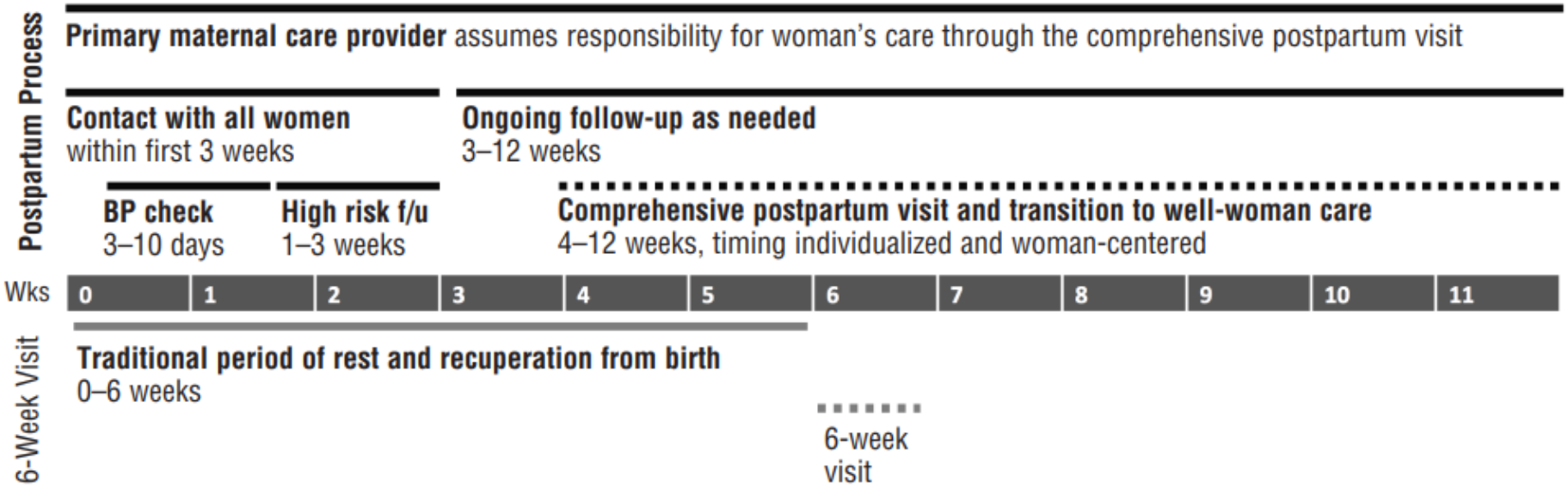
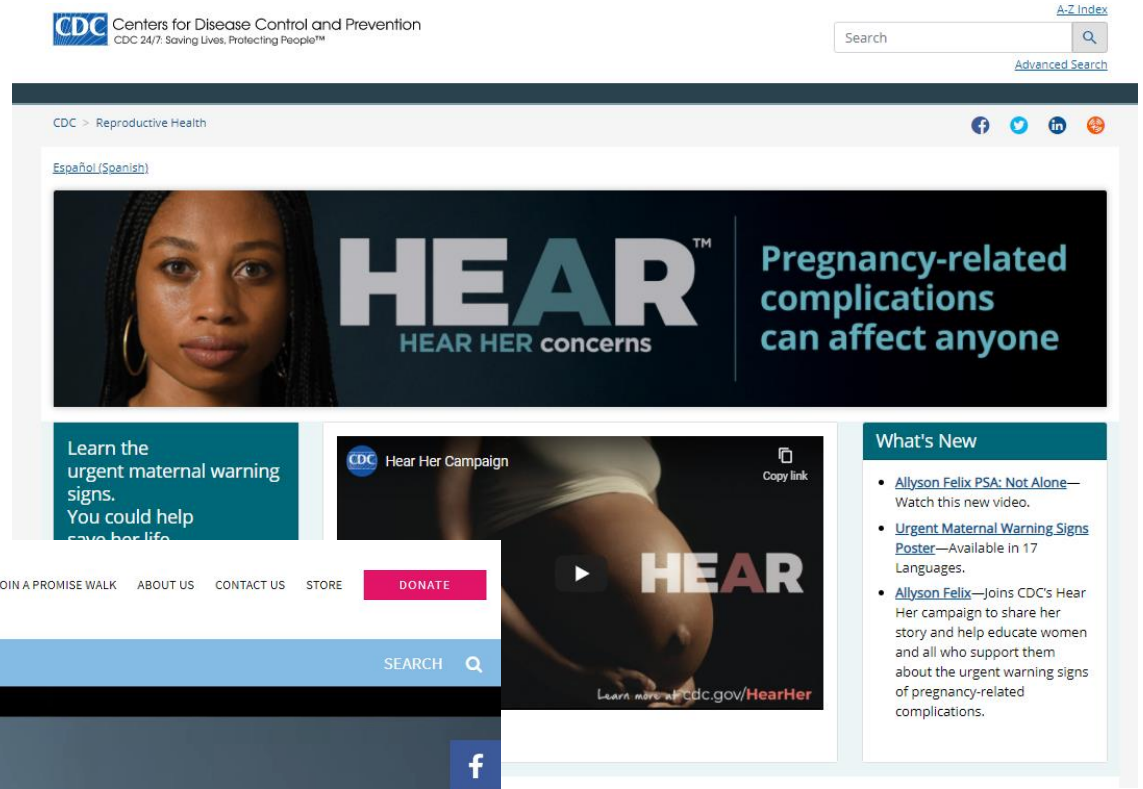


Figure 1. Proposed paradigm shift for postpartum visits. The American College of Obstetricians and Gynecologists' Presidential Task Force on Redefining the Postpartum Visit and the Committee on Obstetric Practice propose shifting the paradigm for postpartum care from a single 6-week visit (bottom) to a postpartum process (top). Abbreviations: BP, blood pressure; f/u, follow-up.

(ACOG 2018 (REAFFIRMED 2021) PG. 142

RESOURCES


CDC Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™
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Español (Spanish)
HEAR™
HEAR HER concerns
Pregnancy-related complications can affect anyone
Learn the urgent maternal warning signs. You could help
Hear Her Campaign
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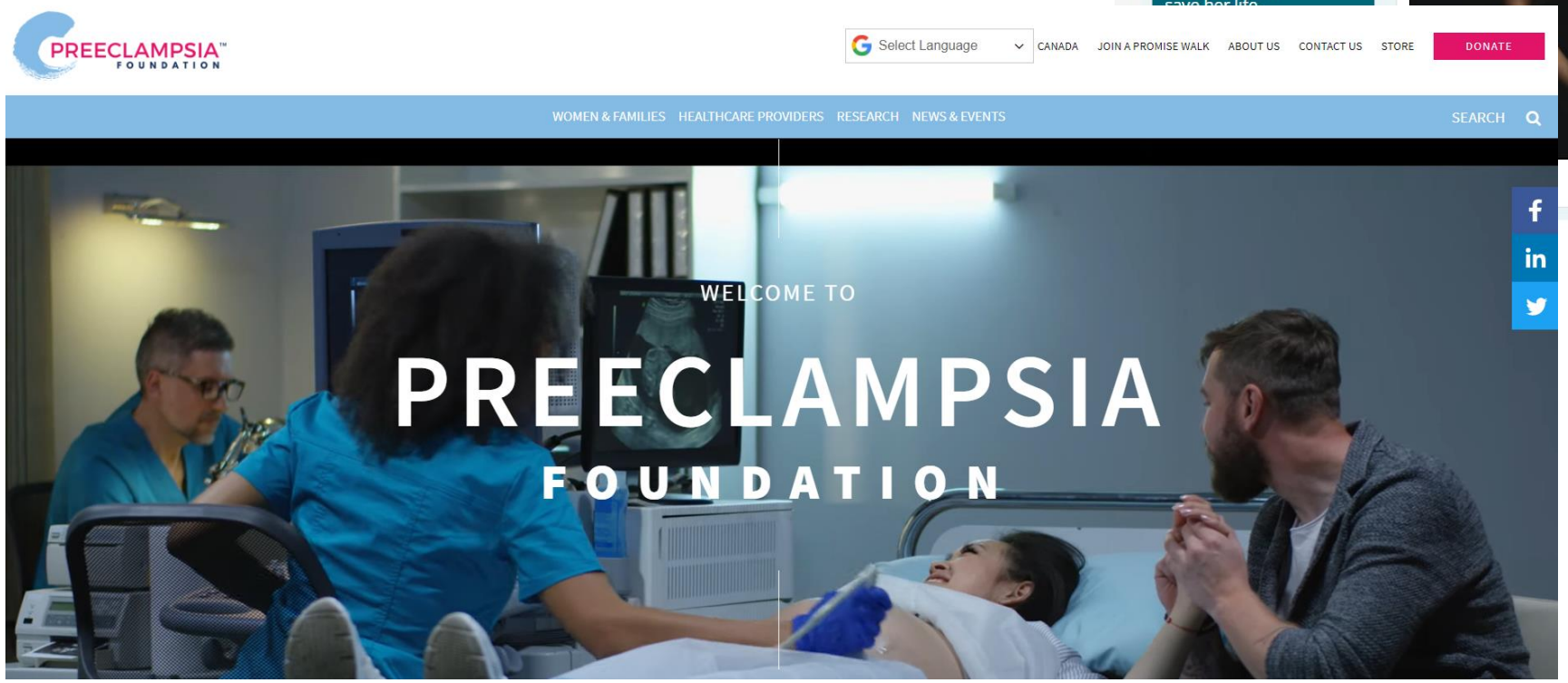
HEAR
Learn more at cdc.gov/HearHer
What's New
Allyson Felix PSA: Not Alone—Watch this new video.
Urgent Maternal Warning Signs Poster—Available in 17 Languages.
Allyson Felix—Joins CDC's Hear Her campaign to share her story and help educate women and all who support them about the urgent warning signs of pregnancy-related complications.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SUGGESTED PATIENT EDUCATION TO BE POSTED IN THE EMERGENCY ROOM

Improving Health Care Response to Hypertensive Disorders of Pregnancy, a CMQCC Quality Improvement Toolkit, 2021.

CMQCC 2021 P. 199

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