

February 17, 2026

# PQC-VT Educational Webinar Series: Caring for Cardiac Conditions in Pregnancy: Procedures & Project Updates

Presented by: Marjorie Meyer, MD

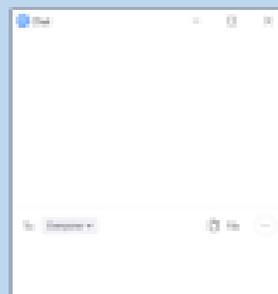
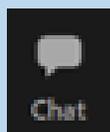
The logo for the Vermont Child Health Improvement Program (VCHIP) is displayed. It features the acronym 'VCHIP' in a bold, dark teal font. The letter 'I' is replaced by a yellow vertical bar with horizontal lines, resembling a stylized ladder or a scale. Below the acronym, the full name 'VERMONT CHILD HEALTH IMPROVEMENT PROGRAM' is written in a smaller, dark teal, all-caps font. The logo is set against a background of several hands of different skin tones, including a child's hand, being held together in a supportive grip.

**VCHIP**  
VERMONT CHILD HEALTH IMPROVEMENT PROGRAM

# Housekeeping

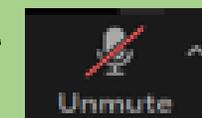
## Chat

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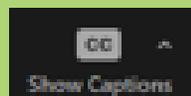
## Microphone

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## Captioning

Click *Show Captions* from your navigation bar to view automated captions.



## Evaluation

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# Acknowledgement

This webinar is partially supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) as part of an award for the Alliance for Innovation on Maternal Health. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by HRSA, HHS, or the U.S. Government.



# Disclosures

None

# Cardiovascular Disease

## Pregnancy, labor, immediate, and later postpartum are all unique in terms of cardiovascular stressors

**Table 1. Cardiovascular Changes in a Normal Pregnancy\***

	First Trimester	Second Trimester	Third Trimester	Stage 1 Labor	Stage 2 Labor	Early Postpartum	3–6 months Postpartum
Cardiac output	↑5–10%	↑↑35–45%		↑30%	↑↑50%	↑↑↑60–80% immediately, then rapidly decreases within the first hour	Return to prepregnancy values
Heart rate	↑3–5%	↑10–15%	↑15–20%	During uterine contractions: ↑40–50%		↓5–10% within 24 hours; continues to decrease throughout the first 6 weeks	Return to prepregnancy values
Blood pressure	↓10%	↓5%	↑5%	During uterine contractions: ↑SBP 15–25% ↑DBP 10–15%		↓SBP 5–10% within 48 hours; may increase again between days 3–6 due to fluid shifts	Return to prepregnancy values
Plasma volume	↑	↑↑40–50%		↑	↑↑	↑↑↑500 mL due to autotransfusion	Return to prepregnancy values

The most profound changes in pregnancy are early, with the rate of change (and adaptation) especially in the second trimester

## Pregnancy, labor, immediate, and later postpartum are all unique in terms of cardiovascular stressors

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Even if cesarean, there are profound changes early postpartum

# Cardiovascular disease clinical pathways

- Screening
- Response
- Specific diseases:
  - Arrhythmias: Palpitations, SVT
  - Chest pain/SOB
  - WPW/Prolonged QT
  - Perimortem cesarean (for ED)

Goal of this presentation:

Pregnant people will wander into your ED with these-how to approach

Overall bottom line: reinforce to team to treat as non-pregnant acutely in any urgent setting then call MFM



# Cardiac Conditions in Obstetric Care Implementation Details

# SCREENING

Screen every pregnant person for cardiovascular conditions:

Readiness Element	Key Points
Unit	<p>All care settings potentially including:</p> <ul style="list-style-type: none"> <li>• Emergency Departments</li> <li>• Urgent Care</li> <li>• Other practice areas where health care providers may not have specialized training in the care of pregnant and postpartum people</li> </ul>
Cardiac Conditions Screen	<p>Should include:</p> <ul style="list-style-type: none"> <li>• Patient history of cardiac conditions</li> <li>• Patient-reported symptoms</li> <li>• Vital signs</li> <li>• Physical examination</li> </ul>

### Look for Red Flags:

Hx: Prior cardiac disease

Symptoms: Shortness of breath at rest, orthopnea

Vitals:

- Resting heart rate  $\geq 120$
- Resting systolic blood pressure  $\geq 160$  mm Hg
- Resting respiratory rate  $\geq 30$
- O2 saturation  $\leq 94\%$

Screening: screened 846 people  
 Screen positive: ~15%  
 Identified 12 true positives  
 ~1%

### Assess for Moderate Factors:

Hx: Age >40; African American, HTN, BMI >35, Diabetes, hx chemotherapy, substance use

Symptoms: shortness of breath, asthma not responsive to therapy, palpitations, dizziness, syncope, chest pain

Vitals:

Resting heart rate  $\geq 110$   
 Systolic blood pressure  $\geq 140$   
 Respiratory rate  $\geq 24$   
 O2 sat  $\leq 96\%$

## Screening is challenging because symptoms are so common in pregnancy

Goals of screening (MM notes not AIM):

### Green:

- Identify baseline-if otherwise healthy, no CV disease or comorbidities (DM, CHTN), look for changes in pregnancy
- If symptoms, check HR, RR, O2 sat each visit (look for objective symptoms)
- Be alert for changes that persist and change pts daily living

### Yellow:

- Realistic: is persistent symptoms send to MFM, internist or family medicine, or cardiology
- EKG, BNP when you refer them

### Red:

- To MFM
- Anyone with poor control of preexisting diabetes or HTN

**Table 2.** How to Differentiate Common Signs and Symptoms of Normal Pregnancy Versus Those That Are Abnormal and Indicative of Underlying Cardiac Disease

	ROUTINE CARE	CAUTION*†	STOP†‡
	Reassurance	Nonemergent Evaluation	Prompt Evaluation Pregnancy Heart Team
History of CVD	None	None	Yes
Self-reported symptoms	None or mild	Yes	Yes
Shortness of breath	No interference with activities of daily living; with heavy exertion only	With moderate exertion, new-onset asthma, persistent cough, or moderate or severe OSA <sup>§</sup>	At rest; paroxysmal nocturnal dyspnea or orthopnea; bilateral chest infiltrates on CXR or refractory pneumonia
Chest pain	Reflux related that resolves with treatment	Atypical	At rest or with minimal exertion
Palpitations	Few seconds, self-limited	Brief, self-limited episodes; no lightheadedness or syncope	Associated with near syncope
Syncope	Dizziness only with prolonged standing or dehydration	Vasovagal	Exertional or unprovoked
Fatigue	Mild	Mild or moderate	Extreme
Vital signs	Normal		
HR (beats per minute)	<90	90–119	≥120
Systolic BP (mm Hg)	120–139	140–159	≥160 (or symptomatic low BP)
RR (per minute)	12–15	16–25	≥25
Oxygen saturation	>97%	95–97%	<95% (unless chronic)
Physical examination	Normal		
JVP	Not visible	Not visible	Visible >2 cm above clavicle
Heart	S3, barely audible soft systolic murmur	S3, systolic murmur	Loud systolic murmur, diastolic murmur, S4
Lungs	Clear	Clear	Wheezing, crackles, effusion
Edema	Mild	Moderate	Marked

# Care Pathway: Cardiac Disease in Pregnancy and Postpartum

Presuming approach is cardiovascular in origin:  
You know how to dx  
preeclampsia, infection etc

## **A pregnant person walks into an ED with:**

Chest pain  
Shortness of breath  
Dizziness  
Palpitations

## Vitals:

HR>110 bpm  
RR>24  
sBP>140  
O2 sat <96%

## Order labs:

- Metabolic profile
- BNP
- DDimer
- Troponin

## Order procedures:

EKG  
CXR (per lung exam)

## Arrhythmia:

- EKG
- Metabolic Profile
- BNP
- (Maternal echo)

## Myocardial Infarction:

- EKG
- Troponin
- (Maternal echo)

## Pulmonary Embolus/Pulmonary process:

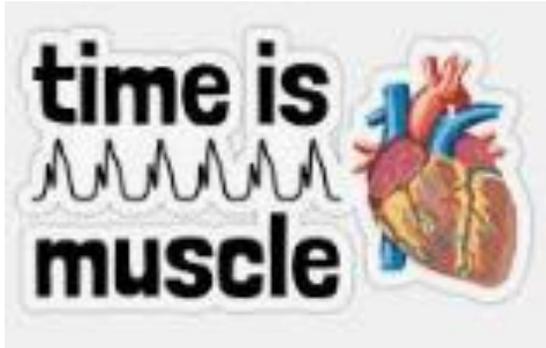
- DDimer
- CXR

## Heart Failure/Cardiomyopathy:

- Metabolic Profile
- BNP
- CXR
- (Maternal echo)

# Care Pathway: Cardiac Disease in Pregnancy and Postpartum

Patient presents with S/S of potential cardiac condition			
<b>Symptoms:</b>		<b>Vitals:</b>	
Chest pain	Palpitations	HR>110 bpm	RR>24
Shortness of breath	Dizziness	sBP>140	O2 sat <96%



<b>Order labs:</b>	<b>Order procedures:</b>
<ul style="list-style-type: none"> <li>• Metabolic profile</li> <li>• BNP</li> <li>• DDimer</li> <li>• Troponin</li> </ul>	<ul style="list-style-type: none"> <li>EKG</li> <li>CXR (per lung exam)</li> </ul>

<b>Initial Management per ED protocols:</b>
<ul style="list-style-type: none"> <li>• Stabilize-care needs to be initiated promptly</li> <li>• Call local OBGYN (if non, MFM or referral hospital)</li> <li>• Consult Cardiology, other specialties as indicated</li> <li>• Call MFM if needed</li> </ul>

Differential Diagnosis Considerations	
Arrhythmia	EKG Metabolic Profile BNP Maternal Echo
Myocardial Infarction	EKG Troponin Maternal Echo
Pulmonary Embolus/ Pulmonary Process	Ddimer CXR
Heart Failure/ Cardiomyopathy	Metabolic Profile BNP CXR Maternal Echo

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Order procedures:

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Presuming approach is cardiovascular in origin:  
You know how to dx preeclampsia, infection etc

**Acute myocardial infarction/Acute  
Coronary syndrome**

**Every postpartum patient with chest pain should  
have consideration of acute coronary  
syndrome/MI:**

- ACS: implies suspicion of myocardial oxygen deprivation leading to myocardial injury/necrosis
- Myocardia ischemia-causes both angina and myocardial infarction
  - due to atherosclerosis, spasm, SCAD
- Spontaneous coronary artery dissection (SCAD):
  - **most common pregnancy-associated cause of acute coronary syndrome**
    - often within a week postpartum (often just after discharge)

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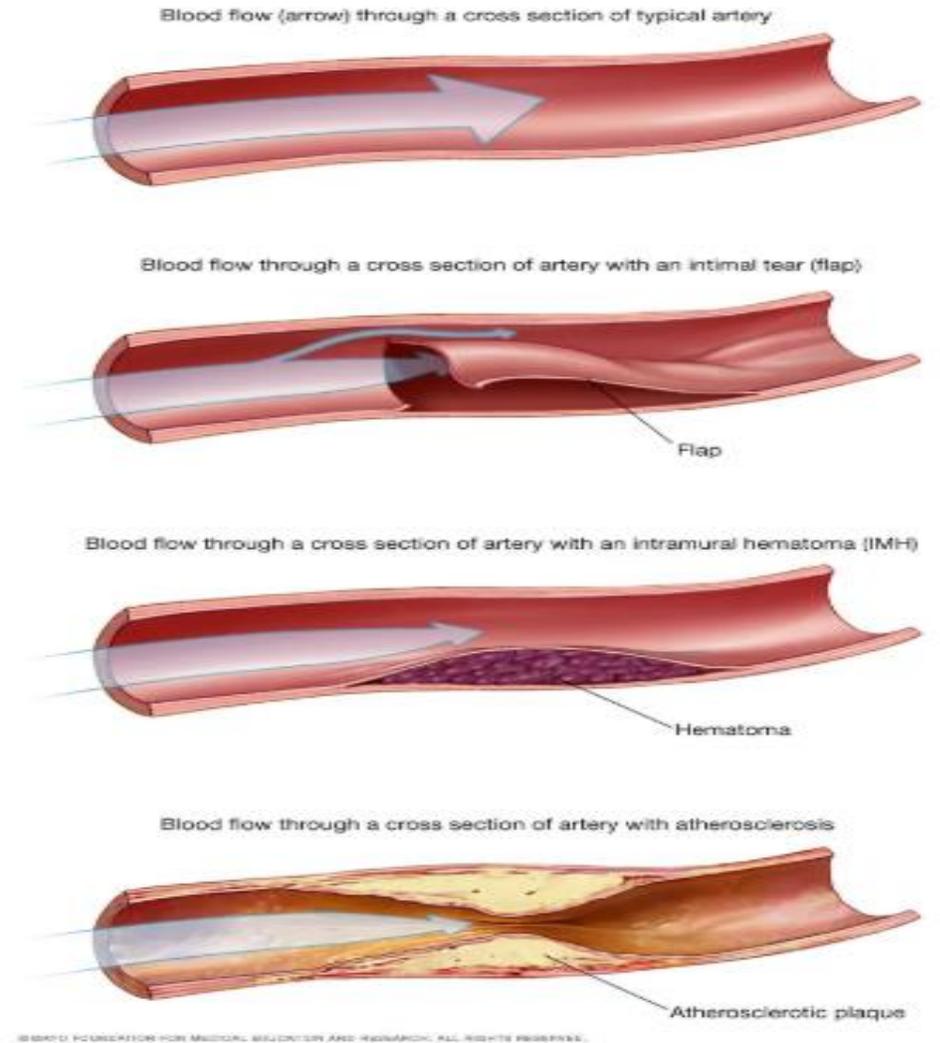
**Acute myocardial infarction/Acute  
Coronary syndrome**

Testing findings:

- EKG-ST elevation
- Note: pregnancy commonly causes non-specific ST and T wave changes
- Troponin (Cardiac Troponin I; Troponin T, high sensitivity troponin:
  - Troponin I Can be slightly elevated early postpartum, preeclampsia, PE, renal disease
- BNP-Brain Natriuretic Peptides (some use NT-proBNP, a precursor): elevation is suggestive of heart failure
  - Increases in pregnancy but still in normal range
  - Normal range can vary by lab: BNP >100 pg/ml; NT-proBNP >450 pg/ml abnormal

# Spontaneous Coronary Artery Dissection

- A tear in the intima (lining) of the coronary artery
- Blood can track through the tear
- Hematoma can form
- Both narrow the coronary artery temporarily
- Can heal without intervention
- Difficult to differentiate from atherosclerotic disease without a cardiac cath

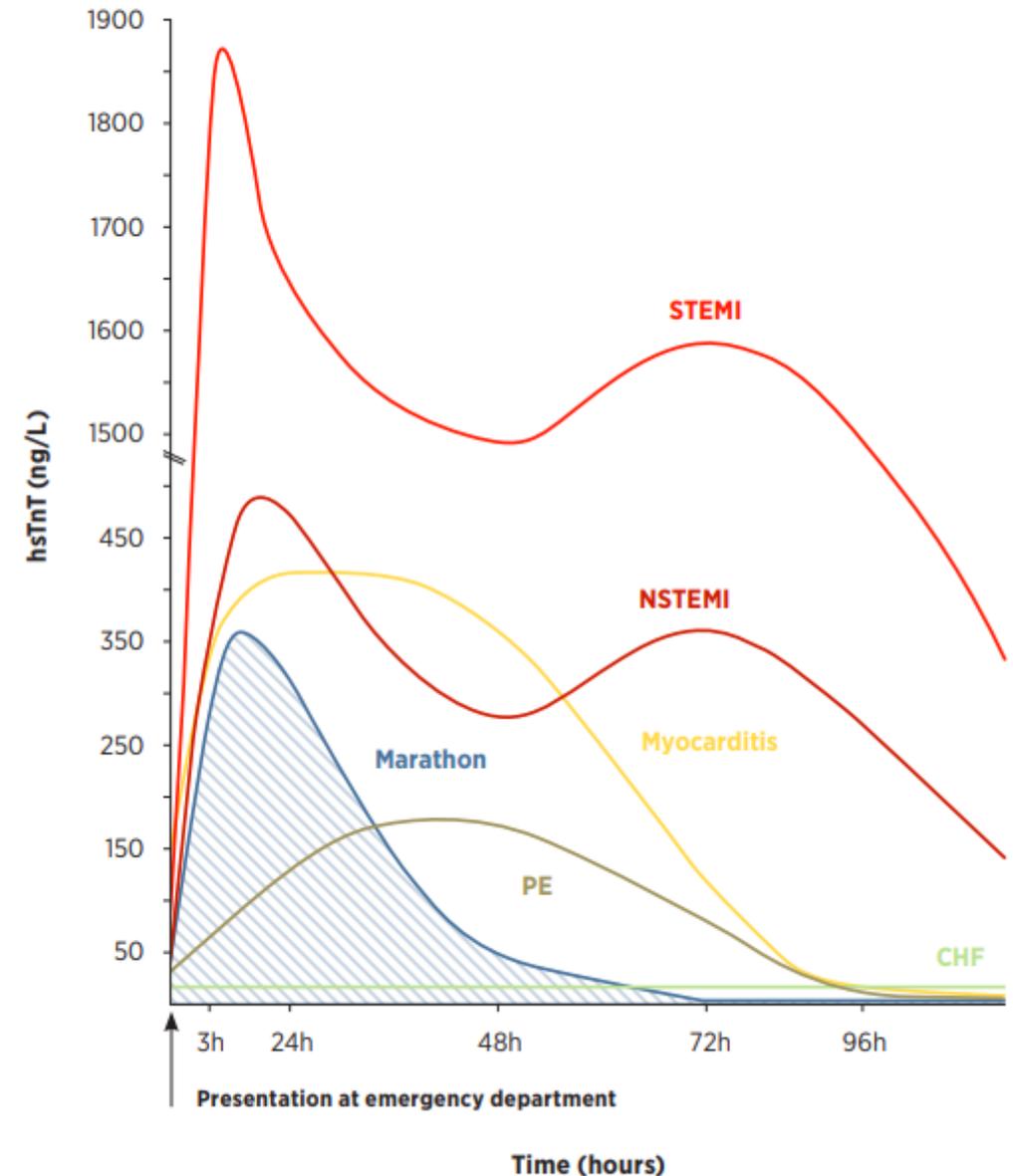


Blood flow in arteries in spontaneous coronary artery dissection (SCAD)

# Troponin

- A complex of myocardial proteins
- Sensitive and specific for myocardial injury
- The high sensitivity assays assist in the most rapid diagnosis of myocardial ischemia
- Troponin I can be slightly elevated early postpartum, with preeclampsia with severe features (sometime called “troponin leak”), renal disease, PE
- Usually tested serially at presentation (0 hrs), and 1 and 3 hrs
  - Level of troponin (>99% for MI)
  - Trajectory of changes over time

Fig. 2 Troponin concentration-time curves<sup>26</sup>



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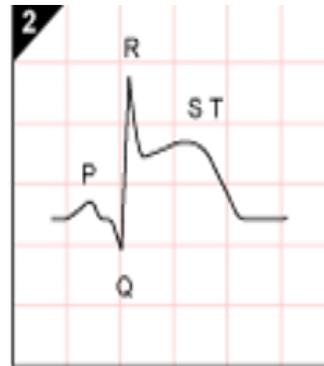
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**Acute myocardial infarction/Acute Coronary syndrome**

**Evaluation and Treatment:**

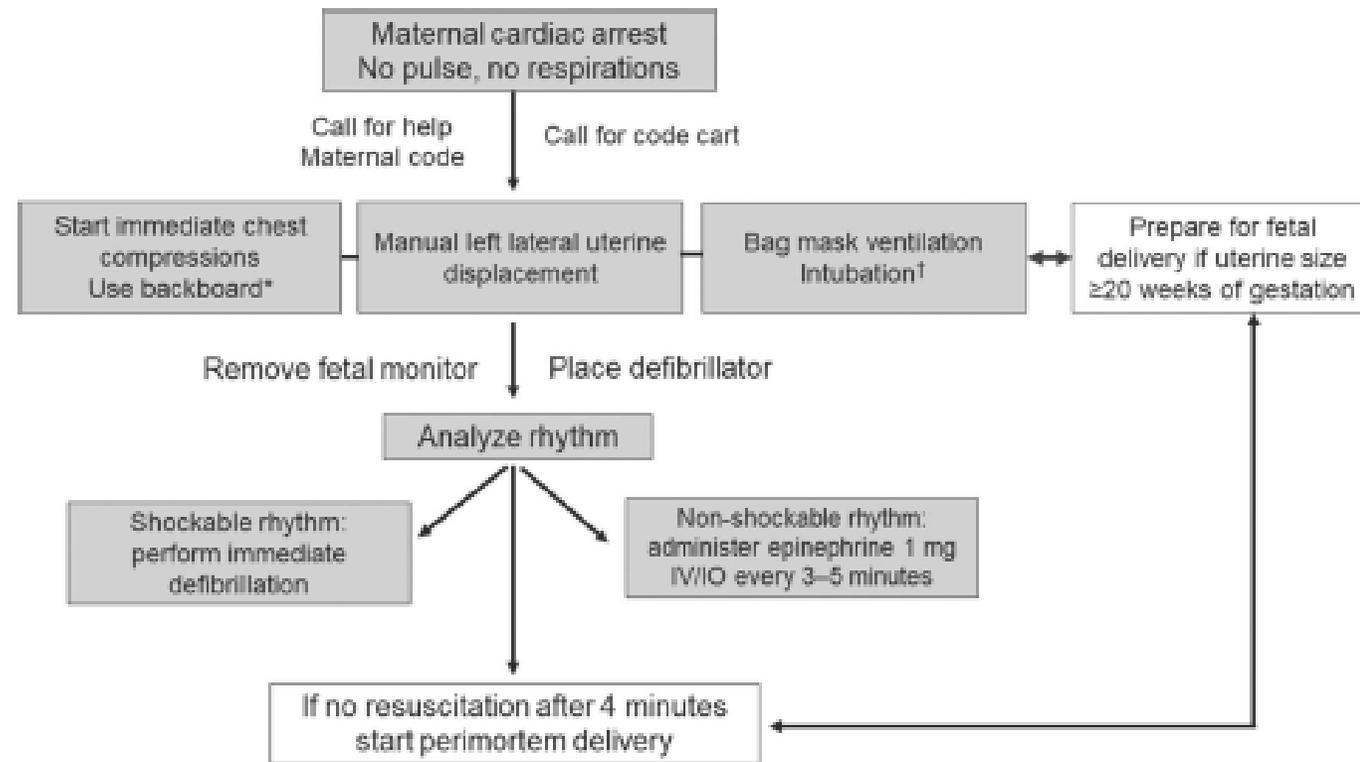
**Goal: coronary flow restoration**

- (1) Medical management: blood pressure, oxygen, nitrates, ASA, IV heparin, beta blockers
- (2) Pregnancy specific: position lateral decubitus, fetal monitoring even if can not intervene to provide information (if feasible), if viable and preterm: betamethasone
- (3) Coronary angiography, balloon and possible stent if atherosclerotic lesion, none if dissection-transfer if not available. Goal: door to balloon 90 minutes
- (4) Maternal coronary perfusion is the priority

Presuming approach is cardiovascular in origin:  
You know how to dx preeclampsia, infection etc

# Readiness

- Every ED should be prepared for perimortem cesarean at 4 minutes
- Initiate if uterine size >20 wks
- Performed where CPR is being performed
- Continue CPR
- Notify Peds and have neonatal resuscitation set up



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Additional Labs:  
TSH  
Free T4

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## Arrhythmia

Identified on initial EKG for presenting symptoms

**Most common:**

- Palpitations, premature atrial contractions, premature ventricular contractions
- SVT
- Afib/flutter

Additional considerations:

- Palpitations, PAC, PVC common and benign
- Most presenting in pregnancy will have a hx of arrhythmia
- Can be associated with PE or cardiomyopathy if new onset
- Inherited arrhythmia syndromes: prolonged QT, Wolf-Parkinson-White

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## Arrhythmia

Identified on initial EKG for presenting symptoms

**Treatment/Response:**

- Assess for hx arrhythmia or any cardiac hx
- Assess electrolyte values
- **Reassurance:**
  - 23% of control pregnant people in a Holter study had symptoms of palpitations
  - 10% of those had an arrhythmia
- If symptoms interoperable (sinus tachycardia, PAC, atrial ectopy)
  - Metoprolol (25-50 mg qd can be BID) or propranolol (20-40 mg up to QID) for symptom control-use lowest effective dose

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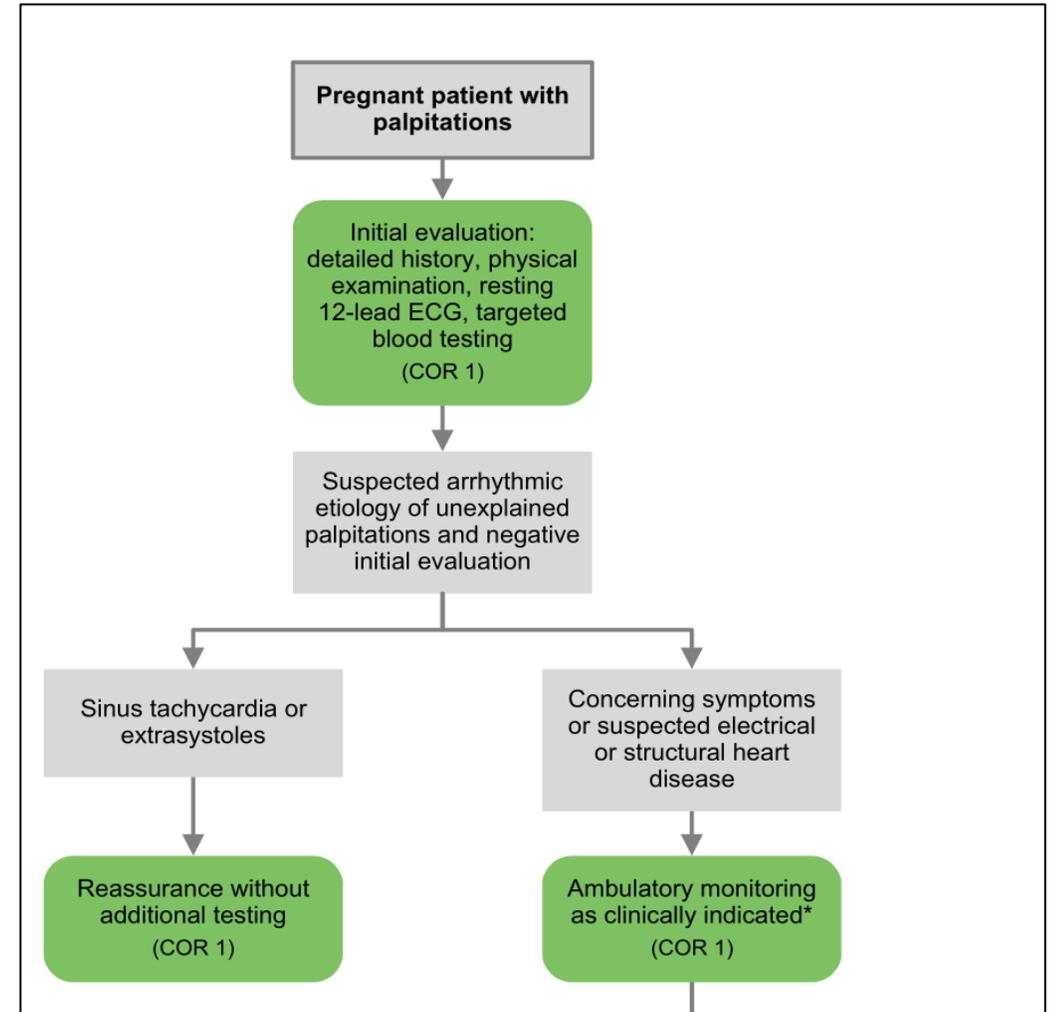
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## Arrhythmias: PAC or PVC

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## Arrhythmia

Identified on initial EKG for presenting symptoms

**Treatment/Response:**

**Management of hemodynamically significant arrhythmias should emphasize prompt use of the most effective therapy to terminate the arrhythmia**

- Vagal maneuvers
- Medications-largely similar to non-pregnant
- Cardioversion-no change except avoid breast tissue (dense and might impede electrical transmission)

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## Arrhythmia: SVT

Identified on initial EKG for presenting symptoms

**Hemodynamically stable:**

- Vagal maneuvers
  - Vasalva maneuver is a deep inspiration, followed by forced exhalation into a tube with a prespecified resistance of 30 to 40 mm Hg for 15 seconds
- Medication: adenosine; second line medication beta blocker

**Hemodynamically unstable:**

- Synchronized direct current cardioversion is recommended, with energy dosing as in the nonpregnant patient (avoid through breast)
- General anesthesia is recommended to protect airway

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## **Arrhythmia:**

**EKG suggestive of prolonged QT (LQTS) or WPW**

### **Prolonged QT:**

- Can be acquired (methadone) or inherited (different genotypes)
- Autosomal dominant
- If on a beta blocker prior to pregnancy: continue (nadolol or propranolol)
- Beta blockers may be indicated in other patients especially postpartum (higher risk); consider treatment during pregnancy/PP for people known to have genetic diagnosis without symptoms
- Meds to avoid with LQTS: azithro, fluconazole
- May need ICD-safe to implant in pregnancy if needed

### **Wolf-Parkinson-White:**

- Dx EKG changes (if no symptoms: pattern; if symptoms: syndrome)
- SVT-flecainide
- ICD implantation

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## Pulmonary Embolism

Suspect with acute chest pain, shortness of breath, tachycardia presenting symptoms

Chest pain, SOB

- Use DDimer for triage prior to CT angio:
  - Low suspicion: DDimer <1000 ng/ml
  - Higher suspicion: DDimer <500 ng/ml

Triage starts with acute stabilization

When stable, use YEARS criteria to decide about need for CT angiogram:

- Clinical signs of DVT
- Hemoptysis
- Pulmonary embolism most likely diagnosis (strong clinical suspicion)

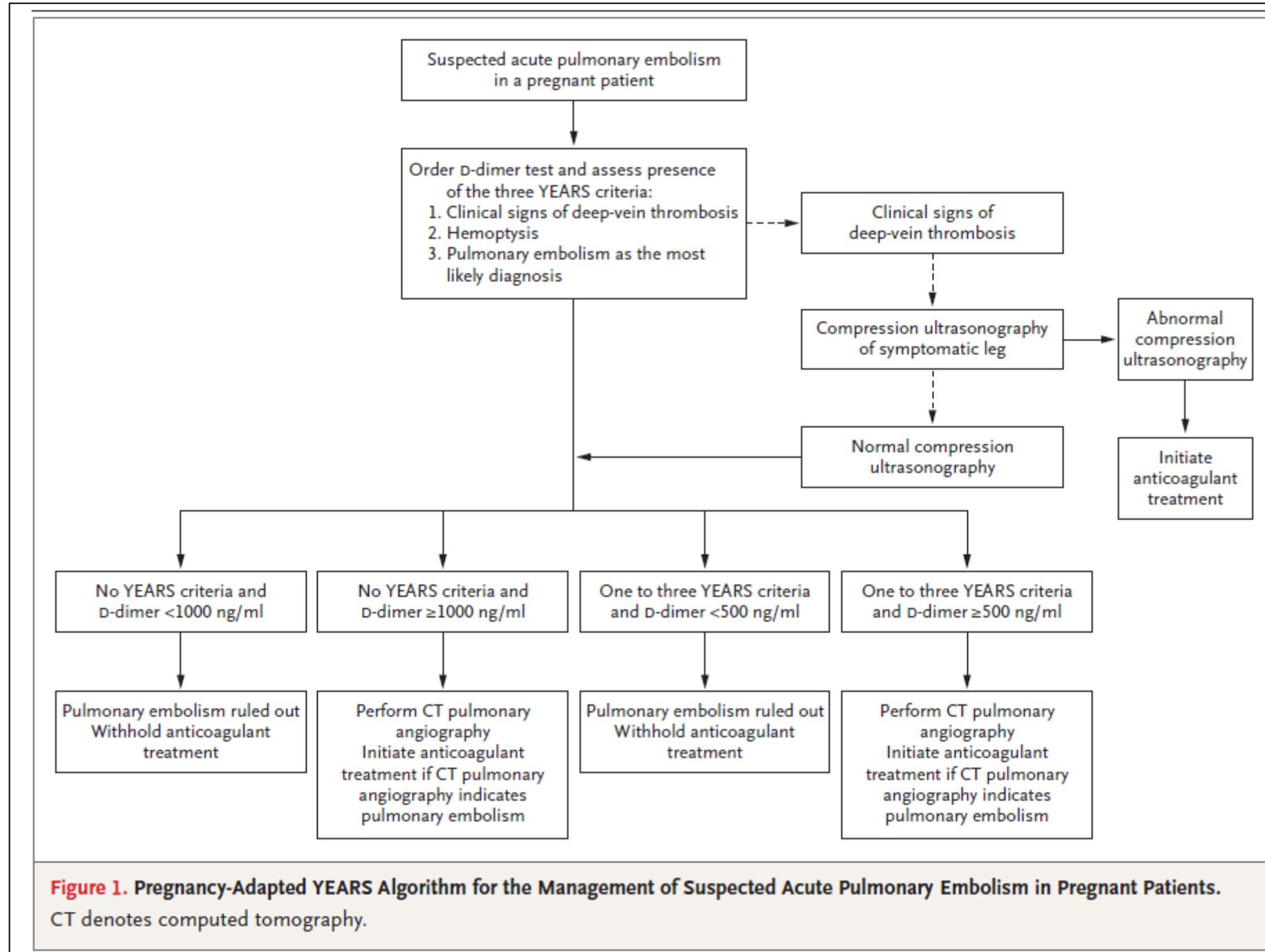
**NO CT needed:**

- No YEARS criteria and DDimer <1000 ng/ml
- One to three YEARS criteria AND DDimer <500

**CT angiogram indicated:**

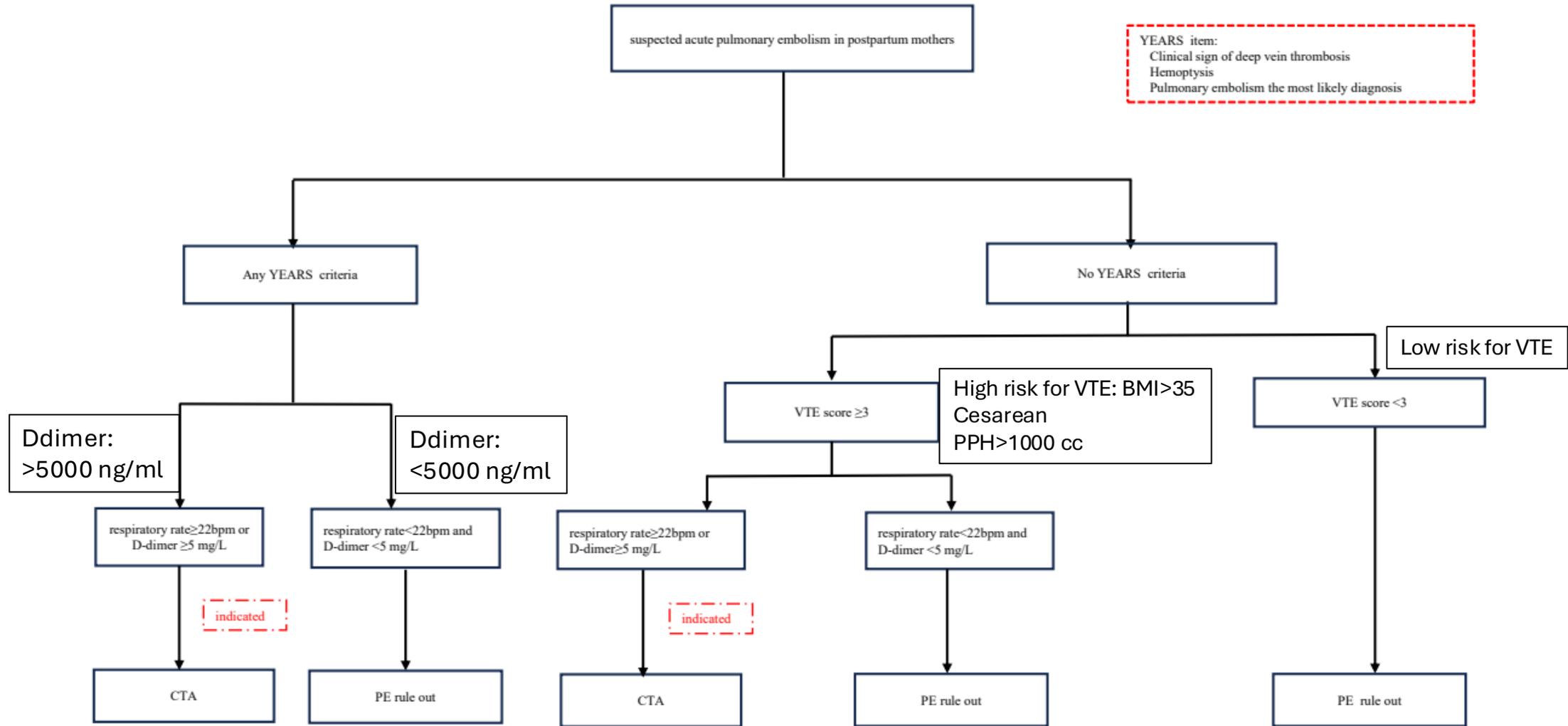
- DDimer >1000 ng/ml
- One to three YEARS criteria AND DDimer >500 ng/ml

**Avoids ~50% of angiograms**



**FIGURE 1**

**Postpartum-adapted algorithm of management of suspected pulmonary embolism in postpartum women.**



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Chest pain, SOB

- Use DDimer for triage prior to CT angio:
- Pregnant:
  - Low suspicion: DDimer <1000 ng/ml
  - Higher suspicion: DDimer <500 ng/ml
- Postpartum:
  - High suspicion: >5000 ng/ml

**Treatment:**

- Therapeutic anticoagulation
  - LMWH Enoxaparin 1 mg/kg BID
  - As effective as IV UFH
- Hemodynamic instability, severe right heart failure: thrombectomy; surgical, catheter directed

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 CXR (per lung exam)

Presuming approach is cardiovascular in origin:  
 You know how to dx preeclampsia, infection etc

**Cardiomyopathy/Heart failure**

Suspect with SOB, pulmonary edema,  
 often HTN

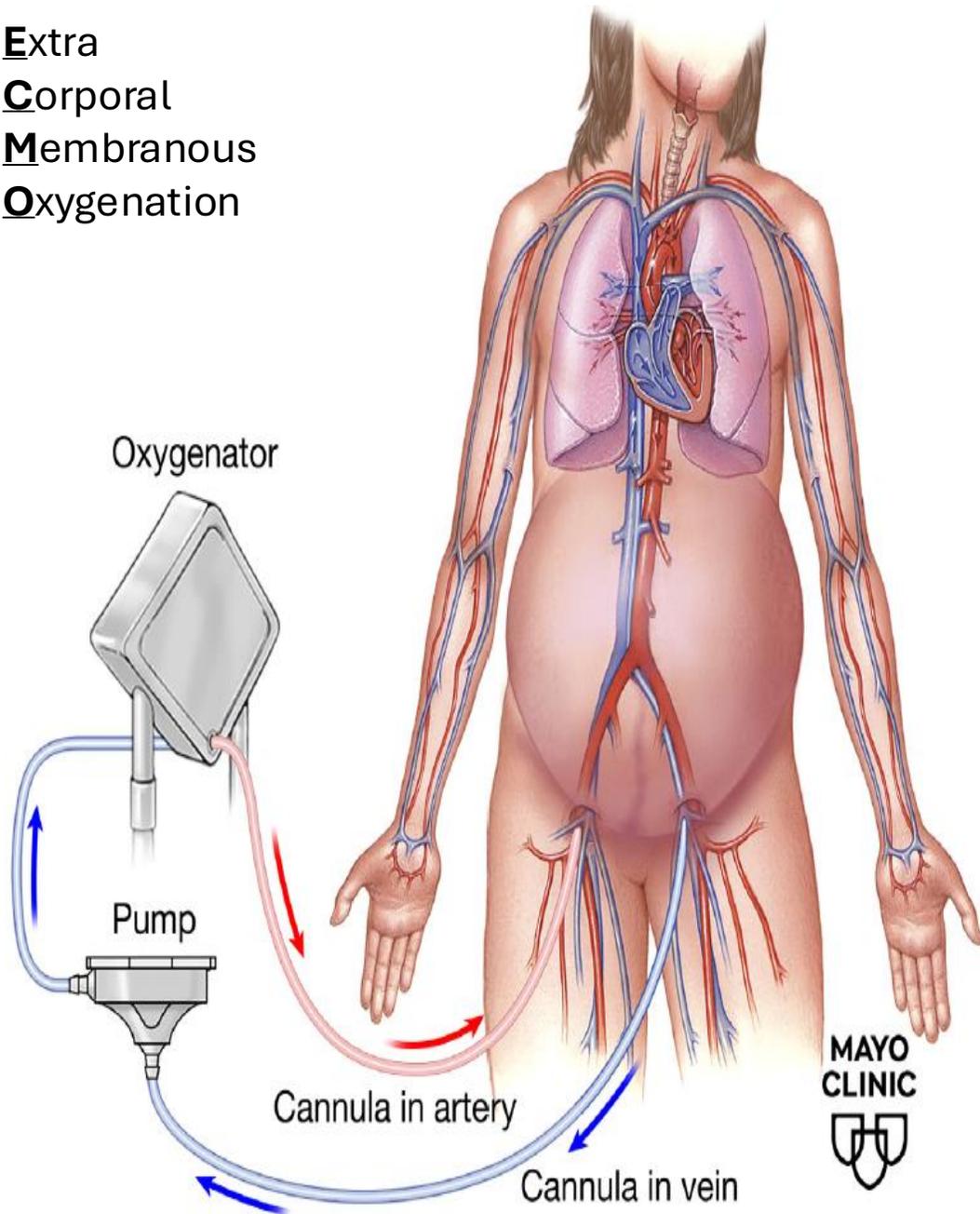
**Cardiomyopathy/Heart failure:**

- Chest pain, SOB
- BNP will be elevated
- Can have low O2 sat
- Etiology will take time, PPCM dx of exclusion

**Treatment:**

- Acute treatment similar regardless of etiology:
  - Diuresis
  - Afterload reduction (antepartum: nitrates, hydralazine; postpartum ACE/ARB)
  - Anticoagulation if EF<35% (low threshold)
  - ECMO (Extracorporeal Membranous Oxygenation)

# Extra Corporal Membranous Oxygenation



# ECMO for OB

Venoarterial (VA) ECMO for peripartum patients

## INDICATIONS for VA ECMO in PERIPARTUM

### Common Peripartum Conditions

- Cardiogenic shock
  - Peripartum cardiomyopathy
  - Refractory arrhythmia
  - Myocarditis
- Pulmonary embolism
- Amniotic fluid embolism
- Septic shock with septic cardiomyopathy
- Local anesthetic systemic toxicity (LAST)
- Acute poisoning
- High neuraxial anesthesia-induced cardiovascular collapse

### Acute Cardiogenic Shock\*

Consider VA ECMO Consult with one or more of the following:

- **SBP<90 or MAP<60**
- **Lactate > 4**
- **ScvO<sub>2</sub>/SvO<sub>2</sub><60%**

\*Due to potentially reversible or correctable cause and despite optimal medical management

**CALL EARLY!**

VA ECMO is employed ideally within **6 hours** of shock refractory to optimal medical management

## CONTRAINDICATIONS

### Relative Contraindications

- Age < 16
- Refractory vasoplegic shock with high output state
- Acute aortic dissection or severe aortic regurgitation
- Uncontrollable hemorrhage/coagulopathy
- Life-limiting comorbidities: severe irreversible neurologic injury, ESLD, ESRD, end-stage lung disease, advanced cancer

## ECMO CONSULT

### UVMCMC

Call PAS

@ 72700 for a

"VA ECMO Consult"

### Outside Hospital

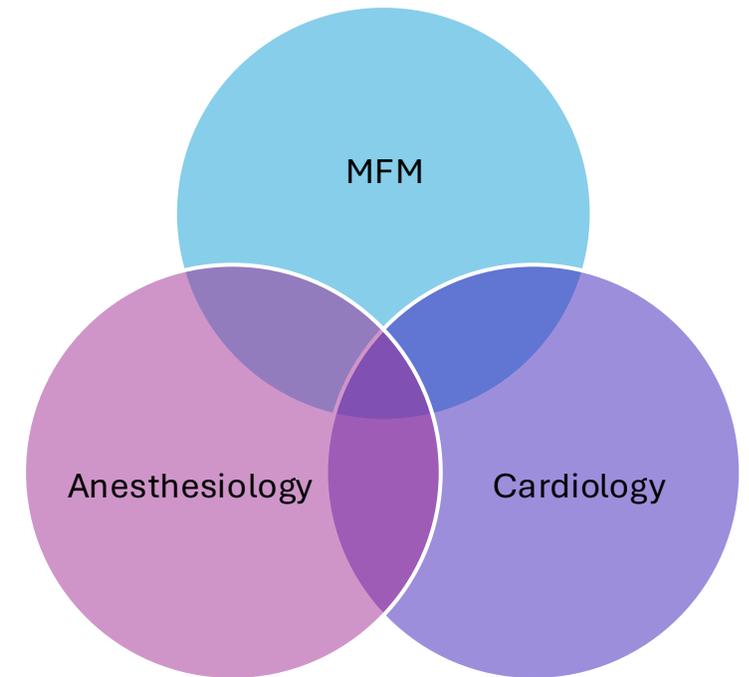
Call UVM Regional Transfer Center

@ 1-866-648-4866 for a

"VA ECMO Consult"

# Pregnancy Heart Team

→ Cardio-Obstetrics Team



### Cardio-Obstetrics team:

- MFM
- Cardiology
- Anesthesiology
- Labor and Delivery and Postpartum Nursing Teams

### Care Planning:

1. Identification cardiac plan needed (utilize a standardized note template in EMR)
2. Multidisciplinary conference



### CARDIO-OB Delivery Plan

#### **Risk stratification:**

mWHO class: \*\*\* (assessment maternal morbidity/mortality in pregnancy with cardiac disease)

CARPREG 2 score: \*\*\* (predict risk of serious cardiac complications)

If ACHD patient, ACHD AP class: {Not Applicable:123282}: Adult Congenital Heart Disease risk of sudden cardiac death or ventricular arrhythmia

Overall Stoplight Color: {Delivery Plan Stoplight:123281}

**Cardiac:**

Type of Cardiac Disease: \*\*\*

Arrhythmias during pregnancy? \*\*\*

Pacemaker/defibrillator? {YES INFO/NO:20542}

If yes:

Pacer dependent? {YES INFO/NO:20542}

Pacer last checked (date and location): {YES INFO/NO:20542}

Magnet needed with cesarean delivery?: {YES INFO/NO:20542}

Anticoagulation? {YES INFO/NO:20542}

If yes, type and dose: {Not Applicable:123282}

Timing of stopping anticoagulation prior to labor: {Not Applicable:123282}

Timing of restarting anticoagulation following delivery: {CMAANTICOAG:132848}

**Intrapartum:**

Telemetry needed? {yes/no/\*:32825}

Intrapartum ICU? {yes/no/\*:32825}

Invasive monitoring? {yes/no/\*:32825}

If yes, specify: {Invasive Monitoring:123286}

Vital sign frequency: {Vital Sign Frequency:131493}

Additional admission labs/testing (Anti-Xa, BNP, EKG, etc): \*\*\*

Any additional equipment needed (IV filters, etc): \*\*\*

Consultations Needed on Admission (ACHD, other): \*\*\*

**Intrapartum IV access and infusions:**

IV Access: {IV Access:131494}

Infusions (IVIG, heparin, insulin): \*\*\*

Fluid monitoring:

Fluid bolus limitations: \*\*\*

Specify fluid shift sensitivity and risk related to neuraxial anesthesia, PPH/massive transfusion (right heart/left heart/pulmonary, and afterload dependency):\*\*\*

Endocarditis antibiotic prophylaxis needed? {yes/no/\*:32825}

**Postpartum:**

Telemetry needed? {yes/no/\*:32825}

Postpartum ICU? {yes/no/\*:32825}

Invasive monitoring? {yes/no/\*:32825}

If yes, specify: {Invasive Monitoring:123286}

Vital sign frequency: {Vital Sign Frequency:131493}

**Postpartum IV access and infusions:**

V Access: {IV Access:131494}

Infusions (IVIG, heparin, insulin): \*\*\*

Fluid monitoring:

Fluid bolus limitations: \*\*\*

Specify fluid shift sensitivity and risk related to neuraxial anesthesia, PPH/massive transfusion (right heart/left heart/pulmonary, and afterload dependency):\*\*\*

**Obstetric:**

Recommended mode of delivery: {Mode of Delivery:123283}

Location of labor: {LaborLocation:132298}

Is assisted 2nd stage indicated: {yes/no/\*:32825}

Cesarean location (Main OR is necessary primarily with high risk of cardiopulmonary bypass/ECMO):

For scheduled (or unscheduled within ~1 hour) Cesarean, delivery location (Main OR vs L&D): \*\*\*

For emergent/STAT Cesarean, delivery location (Main OR vs L&D): \*\*\*

Timing of delivery (gestational age): \*\*\*

Date of induction/cesarean (if planned): \*\*\*

OB Medication Considerations:

Uterine relaxant preferences (Terbutaline, Nitroglycerine): \*\*\*

Antihypertensive preferences (Labetalol, Hydralazine, Nifedipine): \*\*\*

Postpartum hemorrhage preferences (Pitocin, Methergine, Hemabate, Misoprostol): \*\*\*

Postpartum level of care (nursing ratio need and for how long before de-escalation of care): \*\*\*

**Anesthesia:**

Planned labor/operative anesthetic approach:

Postpartum pain control plan:

Bleeding/anatomical concerns for Epidural anesthesia? \*\*\*

Hemodynamic concern for Epidural anesthesia? \*\*\*

With vasopressor need, which vasopressor is preferred (Phenylephrine, Norepi, Vasopressin, Other): \*\*\*

Intraoperative a-line:{yes/no/\*:32825}

Intraoperative central line:{yes/no/\*:32825}

Intraoperative PICC:{yes/no/\*:32825}

Other planned/anticipated intraoperative or postoperative infusions:

**Nursing:**

Patient flow supervisor needs to be notified with potential ICU admission

Special equipment needed in the room (Hoyer, etc): \*\*\*

Pharmacy needs (include clinical pharmacist/pager): \*\*\*

SW needs (housing, family/children): \*\*\*

PEDS/NICU Team (who needs to be at delivery): \*\*\*

Newborn Care (anticipated location of newborn care - NICU, PCN, Routine MB): \*\*

- Pregnant people have a LOT of cardiovascular symptoms
- Most are benign
- Most not benign are obviously not benign (not a lot of hidden danger)

#### Patients to watch for:

- Long standing poorly controlled severe HTN
- Long standing poorly controlled diabetes (especially T1)
- MFM referral

**Table 2. How to Differentiate Common Signs and Symptoms of Normal Pregnancy Versus Those That Are Abnormal and Indicative of Underlying Cardiac Disease**

	ROUTINE CARE	CAUTION*†	STOP†‡
	Reassurance	Nonemergent Evaluation	Prompt Evaluation Pregnancy Heart Team
<b>History of CVD</b>	None	None	Yes
<b>Self-reported symptoms</b>	None or mild	Yes	Yes
Shortness of breath	No interference with activities of daily living; with heavy exertion only	With moderate exertion, new-onset asthma, persistent cough, or moderate or severe OSA <sup>5</sup>	At rest; paroxysmal nocturnal dyspnea or orthopnea; bilateral chest infiltrates on CXR or refractory pneumonia
Chest pain	Reflux related that resolves with treatment	Atypical	At rest or with minimal exertion
Palpitations	Few seconds, self-limited	Brief, self-limited episodes; no lightheadedness or syncope	Associated with near syncope
Syncope	Dizziness only with prolonged standing or dehydration	Vasovagal	Exertional or unprovoked
Fatigue	Mild	Mild or moderate	Extreme
<b>Vital signs</b>	Normal		
HR (beats per minute)	<90	90–119	≥120
Systolic BP (mm Hg)	120–139	140–159	≥160 (or symptomatic low BP)
RR (per minute)	12–15	16–25	≥25
Oxygen saturation	>97%	95–97%	<95% (unless chronic)
<b>Physical examination</b>	Normal		
JVP	Not visible	Not visible	Visible >2 cm above clavicle
Heart	S3, barely audible soft systolic murmur	S3, systolic murmur	Loud systolic murmur, diastolic murmur, S4
Lungs	Clear	Clear	Wheezing, crackles, effusion
Edema	Mild	Moderate	Marked

# Care Pathway: Cardiac Disease in Pregnancy and Postpartum

Presuming approach is cardiovascular in origin:  
You know how to dx  
preeclampsia, infection etc

## **A pregnant person walks into an ED with:**

Chest pain  
Shortness of breath  
Dizziness  
Palpitations

## Vitals:

HR>110 bpm  
RR>24  
sBP>140  
O2 sat <96%

## Order labs:

- Metabolic profile
- BNP
- DDimer
- Troponin

## Order procedures:

EKG  
CXR (per lung exam)

## Arrhythmia:

- EKG
- Metabolic Profile
- BNP
- (Maternal echo)

## Myocardial Infarction:

- EKG
- Troponin
- (Maternal echo)

## Pulmonary Embolus/Pulmonary process:

- DDimer
- CXR

## Heart Failure/Cardiomyopathy:

- Metabolic Profile
- BNP
- CXR
- (Maternal echo)

# Take Home Messages

- Cardiopulmonary symptoms during pregnancy are common
- Serious cardiac issues are NOT common: postpartum is an acute transition and a period of increased susceptibility for cardiac events
- In most cases, treatment is similar to non-pregnant people except for perimortem cesarean
- In general, restoration of maternal hemodynamics takes precedence over pregnancy
- If a rhythm requires electric cardioversion, proceed in pregnancy
- If suspect PE, avoid CT angio by screening with DDIMER

# PostPartum Hypertension Education And Risk Reduction Transition (PP HEARRT) Clinic

- All hypertensive disorders
- 3-6 months postpartum
- Multidisciplinary with Family Medicine provider
  - Option to continue care in their practice if desired
- Nutrition & Cardiology follow up offered
- CV evaluation: BP, lipids, A1C, fasting insulin/glucose, BNP, high-sensitivity CRP, EKG
  
- 94 patients seen over one year (11/2024 – 12/2025)

**PATIENTS WITH A HYPERTENSIVE DISORDER OF PREGNANCY?**

Talk to your patients about a 3–6 month postpartum visit with an MFM fellow and PCP at:

- The time of their diagnosis
- At their BP check appointment
- AT THEIR 6 WEEK POSTPARTUM VISIT

Qualifying patients:

- Delivered at UVM
- Received a diagnosis of:
  - Gestational HTN
  - Preeclampsia w/ or w/o severe features
  - Chronic HTN
  - HELLP syndrome
  - Eclampsia



**Eligible patients will be contacted to schedule a 3-6 month visit to improve their cardiovascular health!**

Visits will include:

- Establishing with FM provider
- Preventative CV risk education/assessment
- Cardiology & nutrition referral
- Opportunity for longitudinal FM care

# Life's Essential 8



- Sleep hygiene and evaluation for disordered sleep
- Psychological health in adjusting to motherhood
- Support for continued smoking cessation – frequent return to use in postpartum period
- Any movement is better than none!

# PP HEARRT Clinic – 11/2024 – 10/2025

	gHTN (22)	PreE w/o SF (27)	PreE w/ SF (39)	cHTN (6)
In-person	19 (86%)	22 (81%)	33 (85%)	6 (100%)
Completed CV evaluation	18 (95%)	21 (95%)	33 (85%)	5 (83%)
Required PCP Referral	7 (32%)	5 (19%)	16 (41%)	2 (33%)
Established with PCP	4 (57%)	3 (60%)	6 (38%)	1 (50%)
Persistent HTN (BP > 130/80)	5 (23%)	10 (37%)	19 (49%)	6 (100%)
Antihypertensive Initiated	1/5 (20%)	1/10 (10%)	6/19 (32%)	0

# Clinical Labs at 3-6 Months Postpartum

	gHTN N=18	PreE w/o SF N=23	PreE w/ SF N=33	cHTN N=3	P-value
HDL	61 ± 14.1	74 ± 21.2	65 ± 22.1	60 ± 20.3	0.332
LDL	103 ± 32.6	105 ± 32.7	122 ± 36.0	116 ± 12.2	0.382
Total Chol	186 ± 39.0	200 ± 31.0	208 ± 41.2	201 ± 19.0	0.296
Trig	109 ± 87.5	105 ± 63.3	105 ± 80.1	126 ± 123	0.927
Glucose	88 ± 9.2	87 ± 12.4	93 ± 18.8	146 ± 79.5	0.06
Insulin	11.4 ± 15.2	8.1 ± 5.2	9.5 ± 12.2	25.3 ± 36.2	0.998
HOMA-IR	2.88 ± 4.5	1.8 ± 1.47	2.3 ± 3.1	13.9 ± 22.1	0.816
BNP	50 ± 102	39 ± 26.2	65 ± 74.2	39 ± 17.1	0.07
A1C	5.2 ± 0.32	5.2 ± 0.37	5.3 ± 0.46	6.7 ± 2.92	0.930
Hs-CRP	5.21 ± 5.51	2.33 ± 2.74	4.15 ± 4.91	7.46 ± 0	0.490

# Clinical Labs at 3-6 Months Postpartum

4 patients diagnosed with new hypercholesterolemia (LDL > 160), all with PreE w/ SF

14 patients received new diagnosis of hypertriglyceridemia

Mothers of SGA infants had lower triglycerides, glucose, and insulin than those with AGA infants.

	SGA (<10%ile) N=11	AGA (10-90%ile) N=71	P-value
HDL	77 ± 15.9	67 ± 20.4	0.164
LDL	103 ± 21.4	110 ± 29.7	0.105
Total Chol	190 ± 24.4	197 ± 33.1	0.134
Trig	52 ± 7.9*	102 ± 64.6*	0.032*
Glucose	81 ± 5.7*	91 ± 13.5*	0.011*
Insulin	4.2 ± 1.19*	10.0 ± 12.95	0.003*
HOMA-IR	0.9 ± 0.27	2.4 ± 3.46	0.069
BNP	42 ± 23.1	60 ± 82.5	0.522
A1C	5.3 ± 0.24	5.2 ± 0.41	0.004*
Hs-CRP	2.20 ± 4.05	3.4 ± 4.04	0.435

# Resources –

## Modules & Toolkits

- [AIM Cardiac Conditions Safety Bundle Module](#)
- [Heart Health for the Pregnant Patient \(ACOG\)](#)
- [American College of Cardiology Toolkit](#)
- AIM Maternal Cardiac Arrest Drill Packet
  - (all inpatient OB units have this)

## Webinars

- [ACOG's Maternal Cardiac Conditions](#)

Coming Summer 2026 -

- VT AIM Escape Room with cardiac case study
- Cardiac Conditions Module for Nursing Staff

# Resources – Patient-facing

## Patient Hand-outs

### Signs & Symptoms of Heart Disease During Pregnancy and Postpartum

Heart disease is the leading cause of death among women in the U.S. who are pregnant or gave birth in the last 5 months (postpartum).

**Symptoms to watch for in late pregnancy and up to five months postpartum:**

- Extreme swelling or weight gain
- Extreme fatigue
- Fainting
- Persistent cough
- Chest pain or fast heart beat
- Severe shortness of breath (especially when lying down)

**If you have any of these symptoms and they don't go away:**

- Contact your OB, midwife, family medicine doctor, or your primary care provider
- Describe your symptoms clearly and explain how sick you feel
- If your symptoms arise postpartum, be sure to tell the provider that you recently had a baby
- If your provider says your symptoms are normal, ask what symptoms should cause you to call or come back

**Go to the Emergency Department**

If you have persistent chest pain or severe shortness of breath, or otherwise feel extremely sick. If possible, take someone with you.

**NOTE:** While some of these symptoms are common in late pregnancy, they may be a sign of heart disease especially if they are severe and do not go away after treatment.

**Any woman can develop heart disease in pregnancy or postpartum, but you are at higher risk if you:**

- Have prior heart disease
- Are over 40 years old
- Have preeclampsia or high blood pressure (hypertension)
- Are African-American (4X greater risk and 8-10X more likely to die of heart disease)
- Are obese

**Bottom line**

- Trust your instincts when you feel something is wrong
- When you see a healthcare provider, bring your partner, friend or family member who can support you and help explain these symptoms are not normal for you
- Seek a second opinion if you don't feel listened to or your symptoms are not taken seriously

Get online support and information: [www.myheartisters.com](http://www.myheartisters.com) [www.womenheart.org](http://www.womenheart.org)

CMQCC CALIFORNIA MATERNAL & CHILD HEALTH CARE COLLABORATIVE PublicHealth  
Funding for the development of this Infographic was provided by Federal Title V MCH block grant funding from the California Department of Public Health; Maternal Child Adolescent Health Division, and Stanford University.

### DID YOU HAVE COMPLICATIONS DURING PREGNANCY?

You may be at a higher risk for heart disease over your lifetime

Which pregnancy complications can increase your risk for heart disease as you age?

- HIGH BLOOD PRESSURE**  
5-10% of all pregnant women
- GESTATIONAL DIABETES**  
7-14% of all pregnancies
- PRETERM BIRTH**  
11.8% of babies were born preterm in 2012.

**Can include:** Gestational hypertension, Preeclampsia (once known as Pregnancy Induced Hypertension (PIH) and Toxemia), Eclampsia, HELLP syndrome

**Mothers who had gestational diabetes are more likely to have this condition again in a future pregnancy.**

**Babies born before 37 completed weeks of pregnancy are preterm, or premature.**

**If you had PREECLAMPSIA, you have 2X the risk of stroke, heart disease, dementia or diabetes and 42% the risk of developing high blood pressure for the rest of your life!**

**If you had GESTATIONAL DIABETES, you are 300% more likely to develop Type 2 diabetes within 5 years, putting you at higher risk for heart disease.**

**Women with PRETERM BIRTH AND PREECLAMPSIA have an 8.10X higher chance of death from heart disease.**

If you had complications in pregnancy, you can lower your risk:

**New Mothers**

- See your health care provider 3-4 months after birth to check your overall physical health. Discuss your pregnancy and any complications you experienced.
- Get a copy of your pregnancy and post-delivery medical records to share with your providers for the rest of your life. Don't wait – records may be destroyed.
- Breastfeed as long as possible. Women whose total lifetime breastfeeding is 6-12 months were 10% less likely to develop heart disease (and it's good for baby too).

If you had one of these complications, speak with your provider when planning your next pregnancy to optimize your health.

**REMEMBER**

It's a MYTH that ALL pregnancy related high blood pressure and gestational diabetes complications go away after the baby is born!

**Mothers With Kids Over One Year**

- Get annual checkups and be screened for heart disease. At this visit, your provider should check your overall physical condition.
- Ask your provider what your test results mean and how you can lower your heart disease risk.
- Try a mobile app to automatically retrieve and store your medical records, so you always have them handy.
- Eat healthy. A diet low in salt, fat, cholesterol and sugar can help you lower your risk for obesity, diabetes and heart disease.
- Maintain a healthy weight. Body Mass Index (BMI) is an estimate of body fat based on height and weight. Less than 25 is healthy.
- Get active for 30 minutes a day, or as recommended by your provider.
- If you smoke, make a plan to quit. Your provider may have resources to support you.
- Take medications as directed. Sometimes a healthy diet and exercise is not enough to lower your risk for heart disease, so your provider may prescribe medications to help.

Get more information and stay heart healthy. [www.cmqcc.org](http://www.cmqcc.org)

SISTER TO SISTER The Women's Heart Health Foundation CMQCC CALIFORNIA MATERNAL & CHILD HEALTH CARE COLLABORATIVE PublicHealth

<https://www.preeclampsia.org/>

# Thank You

## Contact Us:

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## Evaluation:



<https://www.surveymonkey.com/r/BYNNL5R>

