

Cardiovascular Complications in Pregnancy

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Outline

- Physiology of pregnancy review
- Common findings in CVD in pregnancy
- ED Algorithms to detect CVD in pregnancy
- Review of common conditions
- Tools and Resources



Risk Factors for Cardiovascular Complications

- Race/ethnicity
(commonly reported as a risk factor in studies, now widely understood to represent racism as the risk)
- Age (>40)
- Existing hypertension
- Obesity

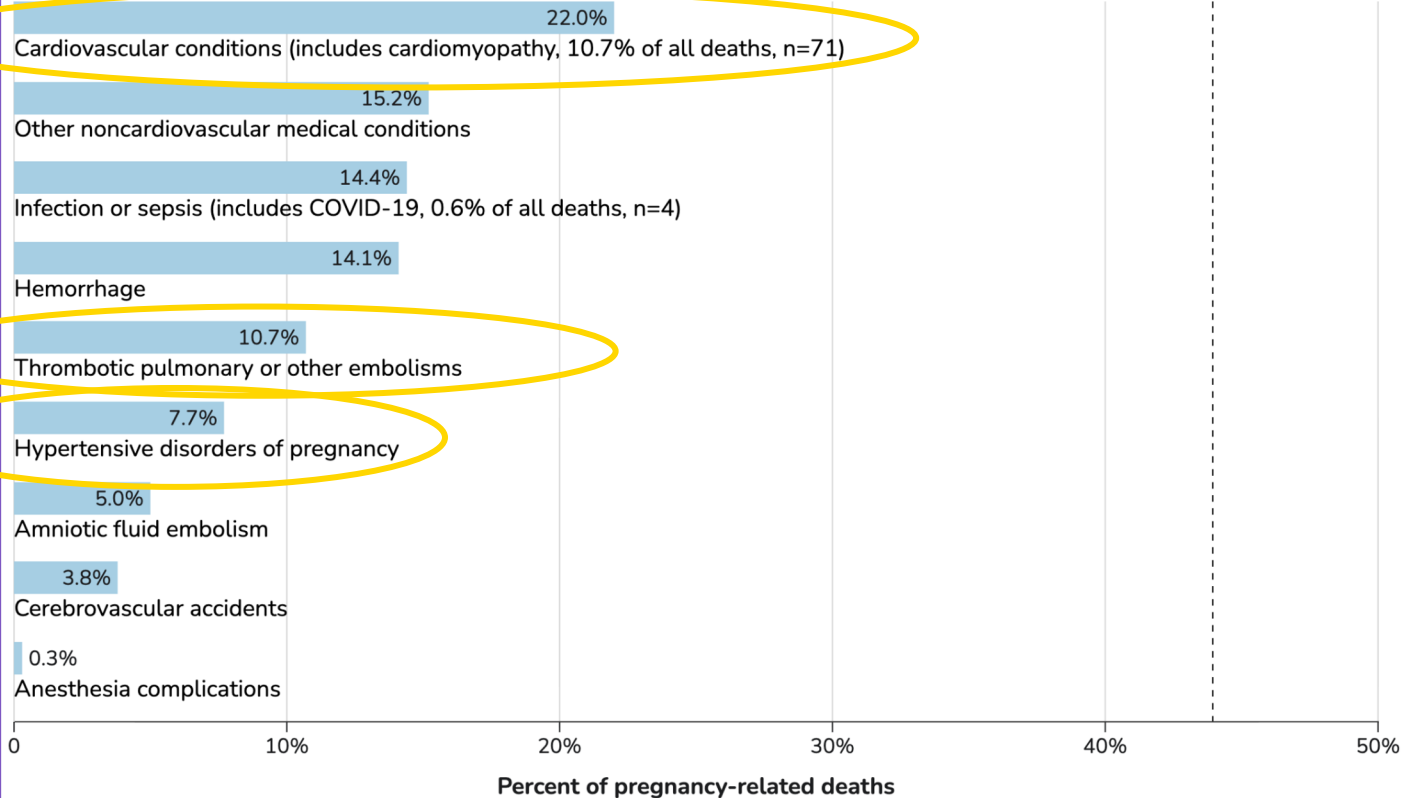


28%

of maternal cardiac deaths were likely preventable
(in a study from Illinois)

Briller et. al.

Causes of pregnancy-related deaths, 2024^a



Physiologic Changes in Pregnancy

	1st	2nd	3rd	Labor	Early PP	3-6mo PP
Cardiac Output	5-10%	35-45%		30-50%	60-80% > rapid decline	Return to pre-pregnancy state
Heart Rate	3-5%	10-15%	15-20%	40-50%	5-10%	
Blood Pressure	10%	5%	5%	~15%	5-10%	
Plasma volume*	↑	40-50%	↑	↑	500ml	

*Physiologic anemia from hemodilution (plasma volume increases more than RBCs)

Cardiac Conditions in Pregnancy

Pre-existing or not related to pregnancy

- Congenital

Beyond the scope of today's lecture, typically patients are already connected with MFM for delivery planning and prenatal care.

- Acquired

- VTE/Vascular Complications
- Myocardial infarction
- Arrhythmia
- Aortic dissection

Pregnancy-related

- Hypertensive disorders of pregnancy
- Peripartum Cardiomyopathy

Signs & Symptoms

Findings from California Pregnancy
Associated Mortality Review

Symptoms:

(SOB, palpitations, chest pain, dizziness, fatigue)

Prenatal - 43%

Labor - 51%

Postpartum - 80%

Exam:

HTN - 64%

Tachycardia (>120) - 59%

Crackles/S3/Gallop - 44%

O₂ <90% - 39%

Labs & Tests

BNP Increases twofold but remains in normal range

Troponin

Same values in pregnancy

Troponin I may be slightly higher postpartum, in PEC w/ SF, acute PE, or CKD

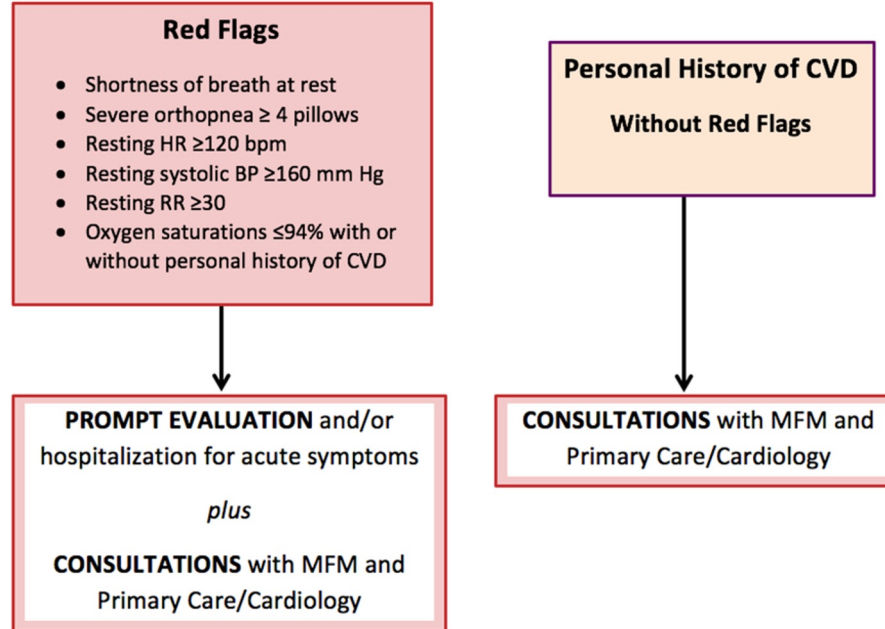
D-Dimer Not recommended in evaluation

ECGs

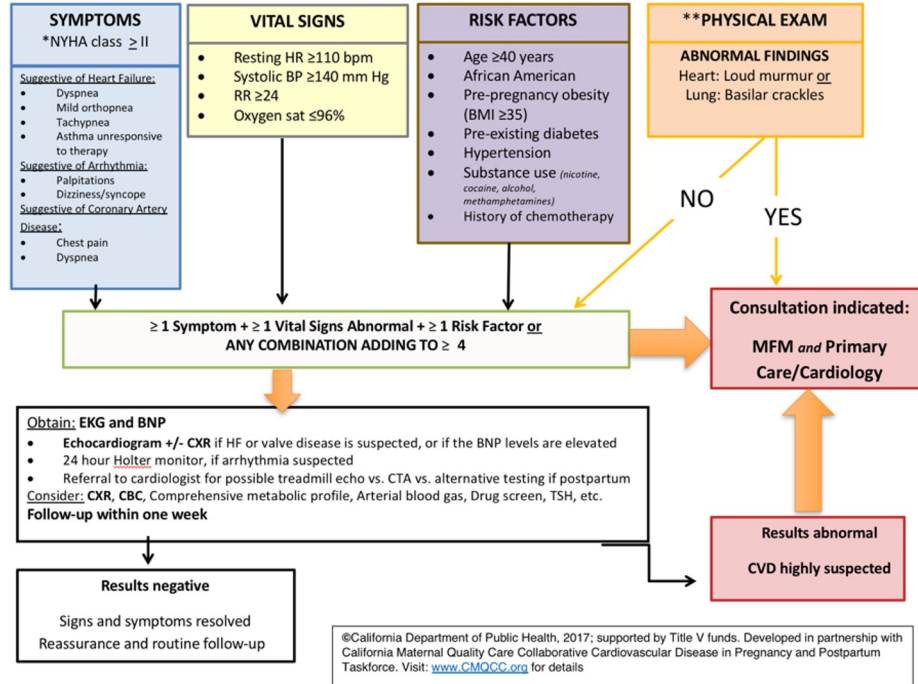
Common to find nonspecific ST-wave and T-wave abnormalities in left precordial leads

Any rhythm changes should be evaluated

CVD Assessment Algorithm For Pregnant and Postpartum Women



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



Cardiovascular Disease (CVD) in Pregnancy & Postpartum Algorithm

Ask your patient:

“Are you pregnant or have you been pregnant in the last 12 months?”

If yes, symptoms may be related to pregnancy and can occur up to 12 months postpartum.

CVD can happen in this patient group regardless of age. Don't ignore red flags!

Red Flags for Cardiovascular Disease

- Shortness of breath at rest
- Chest pain at rest, with minimal exertion or ripping/tearing in quality
- Palpitations associated with near syncope
- Severe orthopnea
- Resting HR ≥ 120 bpm
- Resting systolic BP ≥ 160 or < 90
- Resting RR ≥ 25
- Oxygen saturation $\leq 94\%$, with or without personal history of CVD
- Loud systolic murmur, diastolic murmur, S3, or S4
- Wheezing, crackles on lung exam
- Distended neck veins

Other Signs and Symptoms

may be vague but can include:

Chief Complaints

- Dyspnea
- Edema
- Cough
- Change in exercise tolerance
- Paroxysmal nocturnal dyspnea (PND)

Physical exam findings

- Desaturation with ambulation
- Murmur
- Peripheral edema

Consider in your differential diagnosis:

Myocardial infarction (including spontaneous coronary artery dissection), peripartum cardiomyopathy, congestive heart failure, arrhythmia, aortic dissection

Key Work-up

EKG, BNP, chest X-ray, and troponin

If testing is abnormal, CVD is a possible diagnosis:

- Obtain echocardiogram, consider transferring patient to obtain if not available at your facility
- Consult with cardiology and obstetrics or maternal-fetal medicine, if available
- Consider treatment and admission or transfer as clinically indicated

Treatment

Most medications for the treatment of cardiovascular emergencies do not have robust data surrounding their use in pregnancy and breastfeeding. These medications should **not** be withheld from a pregnant or breastfeeding patient in a life-threatening emergency if they are otherwise indicated. However, long-term use of certain medications should be avoided or may be contraindicated in pregnant or lactating patients; consult a pharmaceutical reference, obstetrics, or cardiology for further considerations.



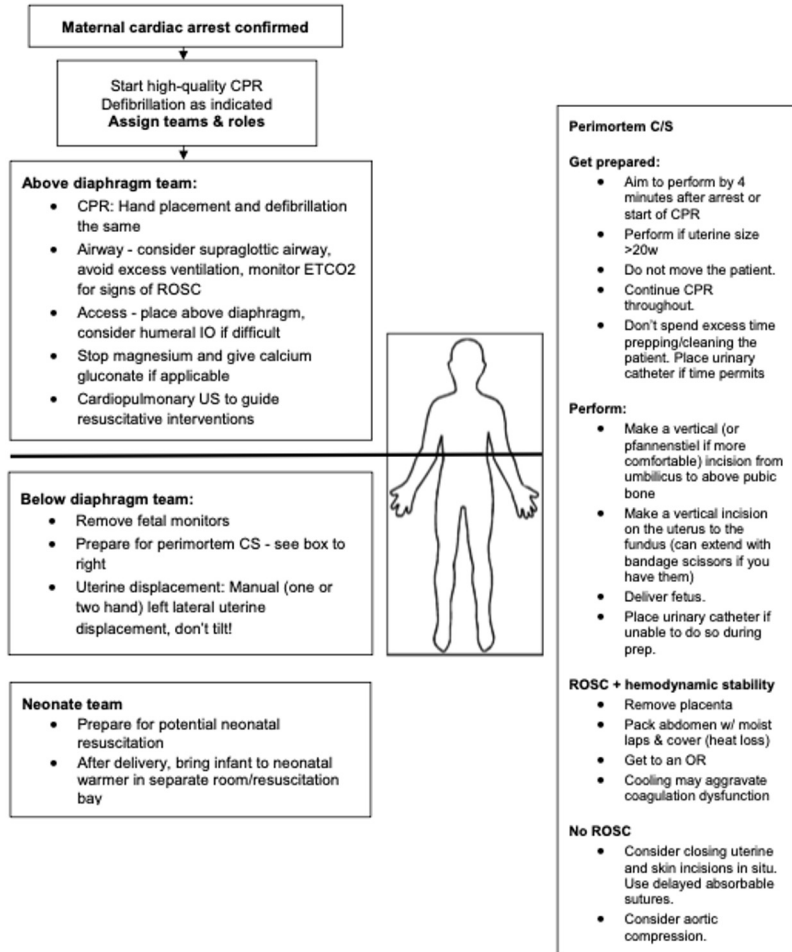
Acquired Conditions: VTE/Vascular

- Why?
 - Pregnancy increases VTE risk 2/2 changes in venous flow (decreased outflow, increased venous stasis, venous compression by uterus), moving less, and hypercoagulability.
- When to be more suspicious:
 - APLS, thrombophilias
 - Smokers

Acquired Conditions: MI/Arrhythmia

- MIs
 - Presentation and findings similar to general population
- Arrhythmias
 - Ventricular arrhythmias uncommon
 - Atrial arrhythmias typically PACs, paroxysmal SVT. Afib or flutter may indicate underlying structural disease in pregnancy.

Maternal Cardiac Arrest



Etiologies - Maternal ABCDs:

A (anesthetic, accident)

B (bleeding)

C (cardiovascular)

D (drugs i.e. magnesium sulfate)

E (embolism - VTE, AFE)

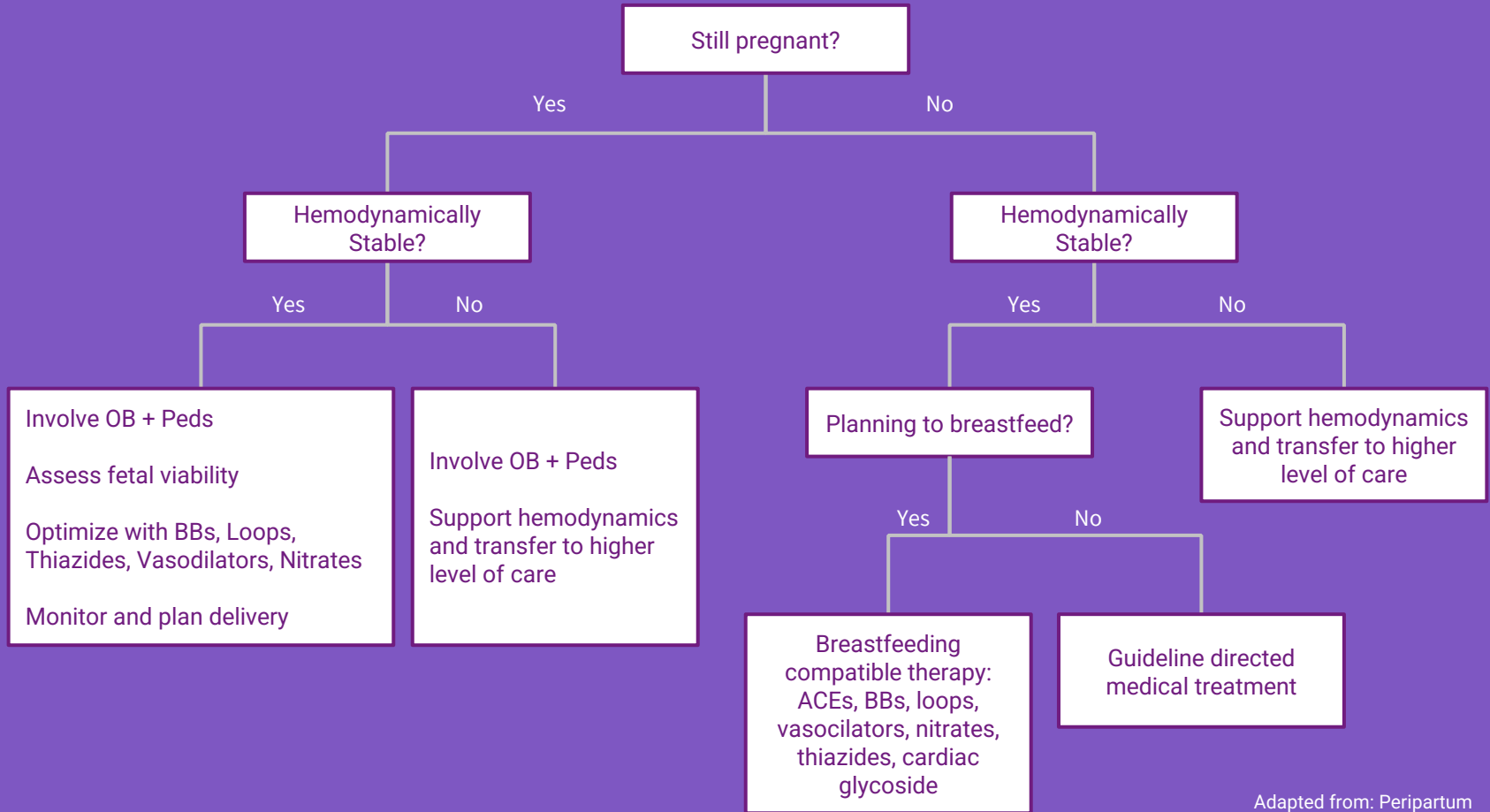
F (fever/sepsis)

G (general - Hs & Ts of non-pregnant cardiac arrest)

H (hypertensive disorders)

Pregnancy Conditions: Peripartum Cardiomyopathy

- Nonischemic
- Presents late in pregnancy or postpartum
- Sxs: SOB, chest pain, palpitations, arrhythmia, fluid retention
- Evaluate with an Echo
- EF < 45% and no history of heart disease



Adapted from: Peripartum
Cardiomyopathy: Treatment and
Prognosis. UpToDate.

Contraception

Table 9: Current Guidelines for Suggested Contraception in Patients with Cardiovascular Disorders

	Peripartum Cardio-myopathy	Valvular Disease on no anticoagulation	Valvular Disease on anticoagulation	Congenital Cardiac Defect
<p>Combined Hormonal Contraceptives: Pill, Patch, Ring</p> <p>Risks include thromboembolism, stroke, myocardial infarction, lipid abnormalities</p> <p>Risk of unintended pregnancy: User dependent up to 9/100</p>	Based on individual patient profile in consultation with cardiologist	Based on individual patient profile in consultation with cardiologist	AVOID	Based on individual patient profile in consultation with cardiologist
<p>Progestin only</p> <p>Risk of unintended pregnancy: User dependent up to 9/100</p>	Recommended	Recommended	Recommended	Based on individual patient profile in consultation with cardiologist
<p>Progestin Injection</p> <p>Risks include fluid overload</p> <p>Risk of unintended pregnancy: 6/100</p>	Recommended	Recommended	Recommended	Based on individual patient profile in consultation with cardiologist
<p>Progestin Implant</p> <p>Risk of unintended pregnancy: Less than 1/100</p>	Recommended	Recommended If mechanical valve, antibiotic prophylaxis	Recommended If mechanical valve, antibiotic prophylaxis	Based on individual patient profile in consultation with cardiologist
<p>Copper IUD</p> <p>Contraindicated in: Allergy to copper; Wilson's disease</p> <p>Risk of unintended pregnancy: Less than 1/100</p>	Recommended	Recommended	Recommended If mechanical valve, antibiotic prophylaxis	Based on individual patient profile in consultation with cardiologist
<p>Levonorgestrel IUD</p> <p>Risk of unintended pregnancy: Less than 1/100</p>	Recommended	Recommended	Recommended If mechanical valve, antibiotic prophylaxis	Based on individual patient profile in consultation with cardiologist

Tools & Resources for ED Providers



ACOG

Safe Motherhood Initiative <https://www.acog.org/community/districts-and-sections/district-ii/programs-and-resources/safe-motherhood-initiative/cardiac-conditions-in-obstetric-care>



Obstetric Emergencies in Nonobstetric Settings Program
<https://www.acog.org/programs/obstetric-emergencies-in-nonobstetric-settings>



California Maternal Quality Care Collaborative <https://www.cmqcc.org/toolkits-quality-improvement/cardiovascular-disease>

Patient resources



Cardio Smart by the American College in Cardiology

<https://www.cardiosmart.org/topics/women-and-heart-disease>

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