GEORGIA PERINATAL QUALITY COLLABORATIVE

# Cardiac Webinar Series:

# EHR Integration of the Maternal Cardiac Conditions Risk Assessment

## Hospital Approaches to Support Buy-in for Builds

February 6, 2024

# Georgia Perinatal Quality Collaborative


**Vision**

Better perinatal outcomes and health equity for every Georgia mother and baby.

**Mission**

To engage stakeholders in implementing equitable, evidence-based perinatal care through a robust data-driven quality improvement collaborative.

# Updates

- Next Maternal Webinar Tuesday, March 5th at 2:00 PM EST

- Q4 2023 HTN and Cardiac Data Submission – Due January 31st with extension through February 8th

  Q1 Jan – March – submission due by April 30th
  Q2 April – June – submission due by July 31st
  Q3 July –Sept. – submission due by October 31st
  Q4 Oct. – Dec. – submission due by January 31st

- Implementation Survey went out in December

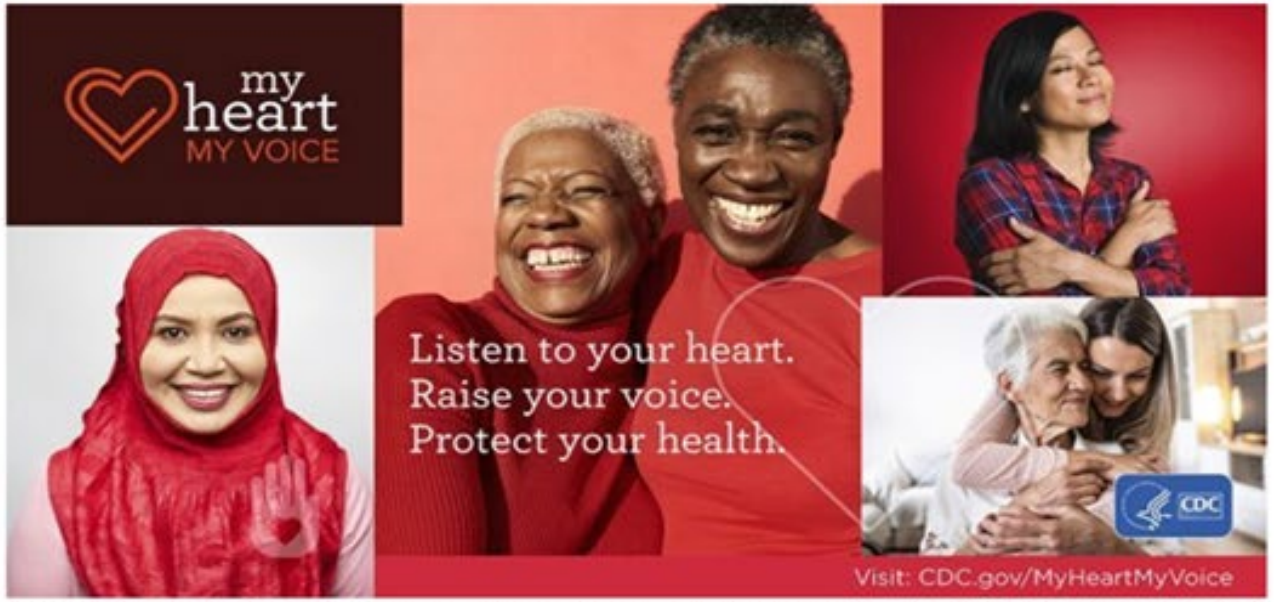
  https://www.surveymonkey.com/r/GaPQCImplementationChecker

- AIM February TAP Webinar

  Title: TeamBirth: Strategies to Improve Your Communication, Teamwork, and Shared-Decision Making for Patient-Centered Care
  Faculty: Barbara O'Brien MS, RN and Amber Weiseth DNP, MSN, RN
  Time & Date: February 15, 2024 – 3 PM ET
  Registration: https://us02web.zoom.us/meeting/register/tZwsd-qvqz8vHdQmWkCiNLLT7ThrfdDr34kg


THE NEXT
GaPQC
GEORGIA PERINATAL QUALITY COLLABORATIVE
GENERATION
ANNUAL MEETING
APRIL 25 & 26, 2024
EMORY CONFERENCE CENTER HOTEL
1615 CLIFTON RD | ATLANTA | GEORGIA

# *American Heart Month*




February is American Heart Month, a time when all people—especially women—are encouraged to focus on their cardiovascular health.

As public health professionals, we are community health workers and employees from federal, state, and local health organizations. We are in a unique position to help raise awareness about women's heart health. The data, statistics, and strategies found in the ***CDC Public Health Professionals Toolkit*** can support our important efforts to improve cardiovascular disease (CVD) rates in our communities. A health equity lens can also help us address the needs of all populations and help improve cardiovascular health for all.

https://www.cdc.gov/heartdisease/american_heart_month_public_health.htm?utm_medium=email&utm_source=govdelivery

# Talking Postpartum Depression

## *A Campaign to Decrease Postpartum Depression Stigma and Encourage Women to Seek Help*


Danielle Augustin, MS, CHWC, CHES®

Office on Women's Health

Office of the Assistant Secretary for Health

Department of Health and Human Services


OASH Office of the Assistant Secretary for Health

## Questions

# Contact Information

Danielle Augustin, MS, CHWC, CHES®

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Office on Women's Health (OWH)
Office of the Assistant Secretary for Health (OASH)
Department of Health and Human Services (DHHS)

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Web: www.womenshealth.gov

Thank you!

# WEBSITE

## https://georgiapqc.org/cardiac-conditions

**Georgia Perinatal Quality Collaborative**

"... engaging stakeholders in evidence-based practices to improve health outcomes for mothers and babies throughout Georgia."

# Key Driver Diagram: Maternal Cardiac Conditions

**GOAL:**

To reduce severe morbidity & mortality related to maternal cardiac conditions in Georgia.

**SMART AIM:**

By 02/6/2026, National Wear Red Day, to reduce harm related to existing and pregnancy related cardiac conditions through the 4th trimester by 20%.

## Key Drivers

**Readiness:** EVERY UNIT - Implementation of standard processes for optimal care of cardiac conditions in pregnancy and post-partum.

**Recognition & Prevention**: EVERY PATIENT - Screening and early diagnosis of cardiac conditions in pregnancy and post-partum.

**Response**: EVERY UNIT - Care management for every pregnant or postpartum woman with cardiac conditions in pregnancy and post-partum.

**Reporting/System Learning**: EVERY UNIT - Foster a culture of safety and improvement for care of women with cardiac conditions in pregnancy and post-partum.

**Respectful, Equitable, and Supportive Care** — EVERY UNIT/PROVIDER/TEAM MEMBER - Inclusion of the patient as part of the multidisciplinary care team.

## INTERVENTIONS

- ❑ Train all obstetric care providers to perform a basic Cardiac Conditions Screen.
- ❑ Establish a protocol for rapid identification of potential pregnancy-related cardiac conditions in all practice settings to which pregnant and postpartum people may present.
- ❑ Develop a patient education plan based on the pregnant and postpartum person's risk of cardiac conditions.
- ❑ **Establish a multidisciplinary "Pregnancy Heart Team" or consultants appropriate to their facility's designated Maternal Level of Care to design coordinated clinical pathways for people experiencing cardiac conditions in pregnancy and the postpartum period. S1**
- ❑ Establish coordination of appropriate consultation, co-management and/or transfer to appropriate level of maternal or newborn care.
- ❑ Develop trauma-informed protocols and training to address health care team member biases to enhance quality of care
- ❑ Develop and maintain a set of referral resources and communication pathways between obstetric providers, community-based organizations, and state and public health agencies to enhance quality of care. *

- ❑ Obtain a focused pregnancy and cardiac history in all care settings, including emergency department, urgent care, and primary care.
- ❑ **In all care environments assess and document if a patient presenting is pregnant or has been pregnant within the past year. S2**
- ❑ Assess if escalating warning signs for an imminent cardiac event are present.
- ❑ Utilize standardized cardiac risk assessment tools to identify and stratify risk.
- ❑ Conduct a risk-appropriate work-up for cardiac conditions to establish diagnosis and implement the initial management plan.

- ❑ Facility-wide standard protocols with checklists and escalation policies for management of **cardiac symptoms**.
- ❑ Facility-wide standard protocols with checklists and escalation policies for management of people **with known or suspected cardiac conditions.**
- ❑ Coordinate transitions of care including the discharge from the birthing facility to home and transition from postpartum care to ongoing primary and specialty care.
- ❑ Offer reproductive life planning discussions and resources, including access to a full range of contraceptive options in accordance with safe therapeutic regimens. *
- ❑ **Provide patient education focused on general life-threatening postpartum complications and early warning signs, including instructions of who to notify if they have concerns, and time and date of a scheduled postpartum visit. S3**

- ❑ For pregnant and postpartum people at high risk for a cardiac event, establish a culture of multidisciplinary planning, admission huddles and post-event debriefs.
- ❑ **Perform multidisciplinary reviews of serious complications (e.g., ICU admissions for other than observation) to identify systems issues. S4**
- ❑ Monitor outcomes and process data related to cardiac conditions, with disaggregation by race and ethnicity due to known disparities in rates of cardiac conditions experienced by Black and Indigenous pregnant and postpartum people. **Process Measures – 1-5**

- ❑ Screen for structural and social drivers of health that might impact clinical recommendations or treatment plans and provide linkage to resources that align with the pregnant or postpartum person's health literacy, cultural needs, and language proficiency.
- ❑ Engage in open, transparent, and empathetic communication with pregnant and postpartum people and their identified support network to understand diagnoses, options, and treatment plans.
- ❑ **Include each pregnant or postpartum person and their identified support network as respected members of and contributors to the multidisciplinary care team. *S5**

# CCOC Process Measures: Reporting and Systems Learning

**P1**: Standardized Pregnancy Risk Assessments for People with Cardiac Conditions

**P2**: Multidisciplinary Care Plan for Pregnant People with Cardiac Conditions

**P3**: OB Provider and Nursing Education – Cardiac Conditions

**P4**: OB Provider & Nursing Education– Respectful and Equitable Care

**P5**: ED Provider and Nursing Education – Cardiac Conditions

**OP1**: Cardiovascular Disease (CVD) Assessment Among Pregnant and Postpartum Women

## Where to download the GaPQC Cardiac Education Resources?

www.georgiapqc.org/cardiac-education

## Where to submit print order?

Steve McCart
Standard Press
Steve@stpress.com
678-557-6801

# Connie Graves, MD

Medical Director,
Tennessee Maternal Fetal Medicine
Director of Perinatal Services
Ascension Saint Thomas Hospital

# Quality Improvement Not for the Faint of Heart

Cornelia R. Graves MD
Medical Director, Tennessee Maternal Fetal Medicine
Director of Perinatal Services, Ascension St. Thomas
TIPQC Co-Leader, Cardiac Conditions of Obstetric Care

# Disclosures

- I have nothing to disclose

# Objectives

- At the end of this presentation, the participant will be able to
  - Understand the importance of cardiovascular screening
  - Address the issues of the implementation of the tool in the EMR
  - Develop strategies to assist in moving forward in implementation at sites that provide obstetrical care

# WHY SCREENING IS IMPORTANT

- **CVD is the leading cause of maternal mortality in the USA primarily due to lack of suspicion and delays in diagnosis. Approximately one third of the CVD related maternal deaths are preventable provided the diagnosis of CVD is made earlier.**
- CVD is also responsible for maternal morbidity including longer length of hospital stay, intensive care unit (ICU) admissions, and future pregnancy risks.
- **California mortality review indicate that 92% of these symptomatic women would have 'screened positive', i.e. high risk of CVD, if this CMQCC CVD toolkit algorithm was applied, would have received appropriate timely care and may have saved mother's life.**

# WHY SCREENING IS IMPORTANT (CONT.)

- Even though timely diagnosis of CVD is critical, potential challenges include:
  - Pregnancy being a state of hemodynamic stress, may lead to signs and symptoms that are very similar to those of CVD such as shortness of breath, fatigue and swelling.
  - CVD is often not suspected by the obstetric providers when evaluating pregnant or postpartum women with symptoms suggestive of CVD.
  - Not surprisingly, these women were either misdiagnosed or their symptoms dismissed, leading to delays in the recognition and treatment of CVD that led to serious short- and long-term morbidity

- African-American and Indigenous women exhibit three-to-four-fold higher pregnancy related mortality rate, higher prevalence of pre-existing CVD; hypertensive disorders of pregnancy; and peripartum cardiomyopathy (PPCM) compared to other racial/ethnic groups. There is a need for a standardized screening tool to guide clinicians in identifying women at risk of CVD who require additional testing and follow up.
- **This could potentially reduce the CVD-related morbidity, particularly among African-American women.**

# Why is CVD so difficult to recognize in pregnancy?

# Signs and symptoms of normal pregnancy versus heart failure

| Present in normal pregnancy | Suggest cardiac pathology |
|---|---|
| Fatigue | Chest pain |
| Exertional dyspnea | Severe breathlessness, orthopnea, PND, cough |
| Palpitations | Atrial flutter or fibrillation, SVT |
| Elevated jugular venous pressure | Systemic hypotension |
| Sinus tachycardia(10-15%) above normal heart rate | Sinus tachycardia, >15% above normal heart rate |
| Full volume pulse | |
| Third heart sound | Fourth heart sound |
| Systolic flow murmur | Pulmonary edema |
| Pedal edema | Pleural effusion |

# How to Differentiate

| | ROUTINE CARE<br>Reassurance | CAUTION*†<br>Nonemergent Evaluation | STOP†‡<br>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§ | 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 |

ACOG Practice Bulletin No. 212: Pregnancy and Heart

# HOW DID WE GET STARTED-Moore Grant

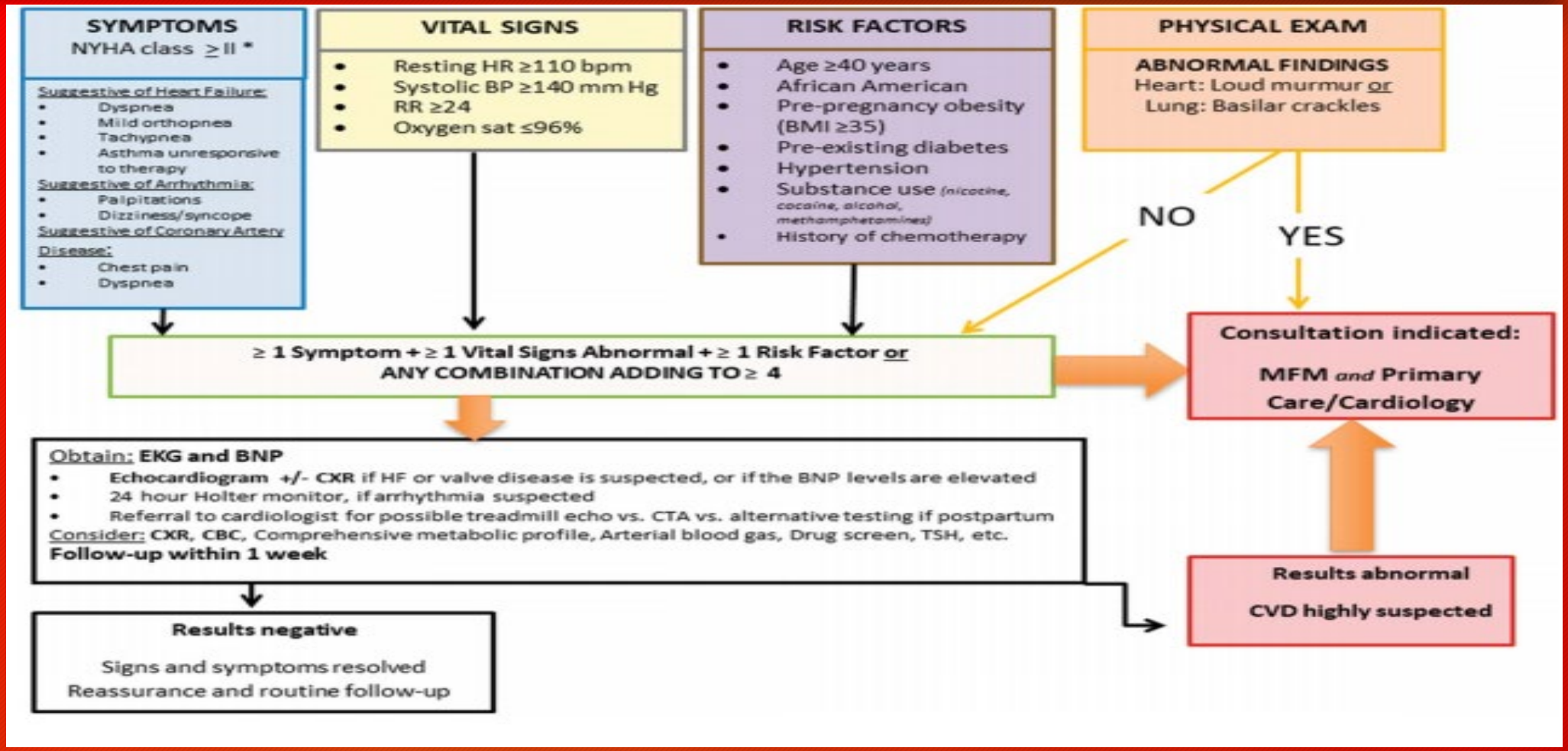
- *CVD is defined as abnormal cardiac structure or function demonstrated by echocardiogram or other imaging studies (systolic dysfunction, diastolic dysfunction, ventricular/septal hypertrophy or dilation, pulmonary hypertension, valve disease), or an arrhythmia.*

  ***We propose to screen all pregnant women either during pregnancy or in the postpartum period for CVD, and focus on two measures:***

- *The proportion of pregnant/postpartum women that receive screening*

- *The proportion of women with a positive screen who receive follow-up care*

# Cardiovascular Screening



# Cerner Build

- Engaged stakeholders
- Education of the stakeholders
- Developed a process for retrieving data
- Test the screen with stakeholders
- Education for staff
- Final implementation

OB Screen - ZZTEST, MOMCHRISTY

*Performed on: 06/05/2020 0954 CDT

- General
- COVID-19 Screer
- COVID-19 Alert
- Emerging Pathoge
- Antepartum Inform
- Antepartum Risk I
- Pregnancy History
- Medical/Surgical
- Medical Screenin
- Birth Plan New
- Allergies/Medicati
- Height and Weigh
- CVD Risk Screen
- Additional Problen

## Maternal Cardiovascular Disease Risk Screen

**Maternal CVD Risk Assessment Symptoms**

- [ ] None
- [ ] Shortness of Breath
- [ ] Orthopnea
- [ ] Tachypnea
- [ ] Asthma Unresponsive to Therapy
- [ ] Palpitations
- [ ] Dizziness/Syncope
- [ ] Chest Pain

**Maternal CVD Risk Assessment Vital Signs**

- [ ] None
- [ ] Resting Heart Rate >=110bpm
- [ ] Systolic BP >=140mmHg
- [ ] Respiratory Rate =>24
- [ ] Oxygen Saturation <=96%

**Maternal CVD Risk Assessment Factors**

- [ ] None
- [ ] Age >=40
- [ ] African American
- [ ] Pre-pregnancy BMI >=35
- [ ] Pre-existing Diabetes
- [ ] Hypertension
- [ ] Substance Abuse
- [ ] History of Chemotherapy

**Maternal CVD Risk Positive**

- ( ) Yes
- ( ) No

**Notify Provider to consider MFM/Cardiology Consult, (Provider to consider EKG, BNP, Echocardiogram, Holter Monitor, Other: CXR, CBC, Comprehensive Metabolic Panel, Arterial Blood Gas, Drugs Screen, TSH)**

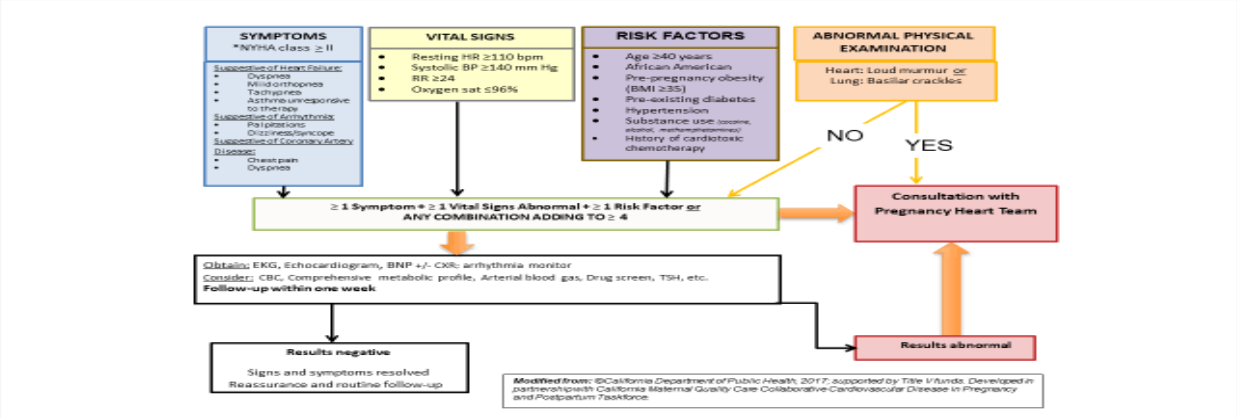
**1 Symptoms, + 1 Vital Sign + 1 Risk Factors**

**Or**

**Maternal CVD Risk Assessment Score (Greater than or equal to 4)**

**=**

**Maternal CVD Risk Assessment Positive**




**Your patient has screened positive for possible CVD**

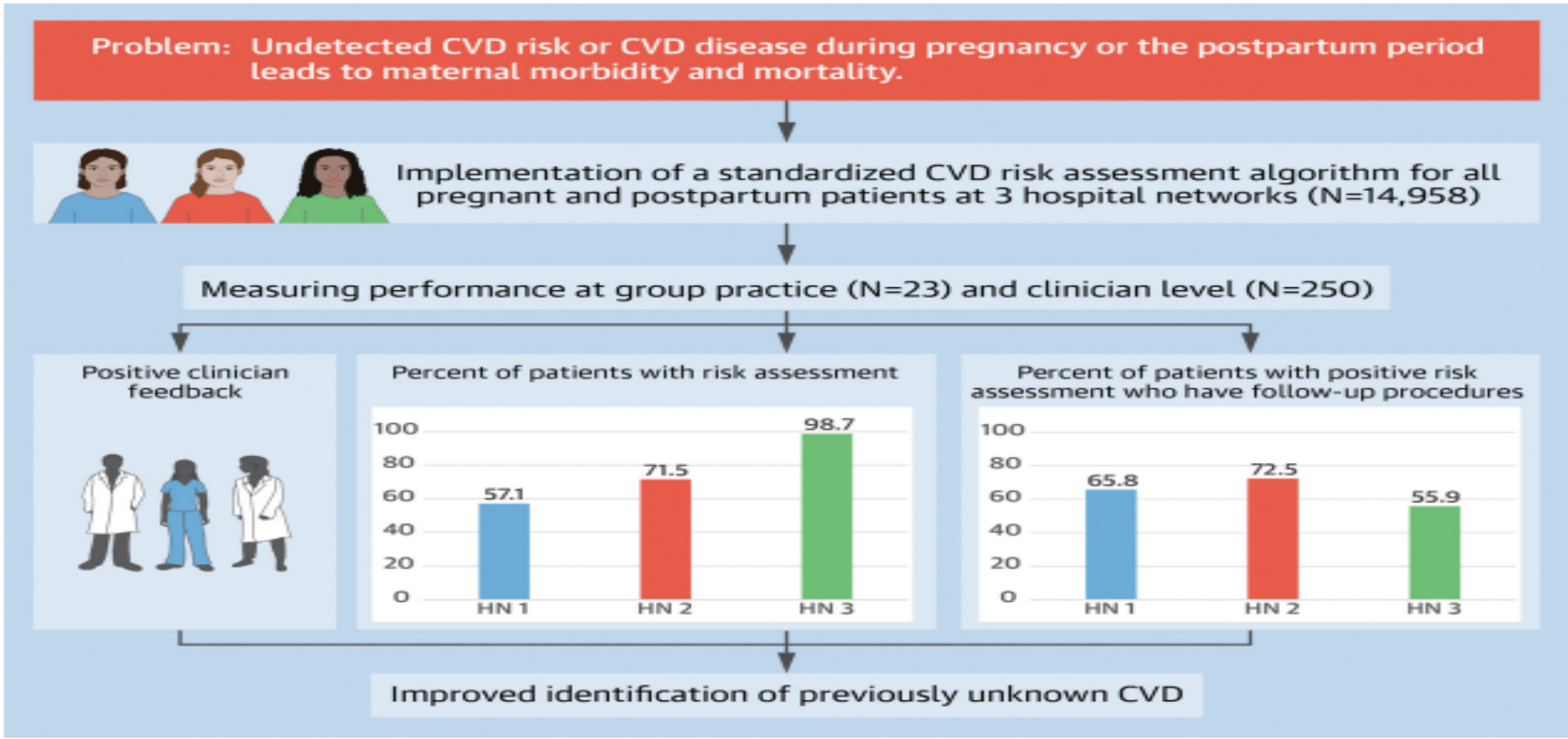
**We suggest the following studies**

**BNP--ECHO--ECG**

**or Referral to TNMFM for further evaluation**

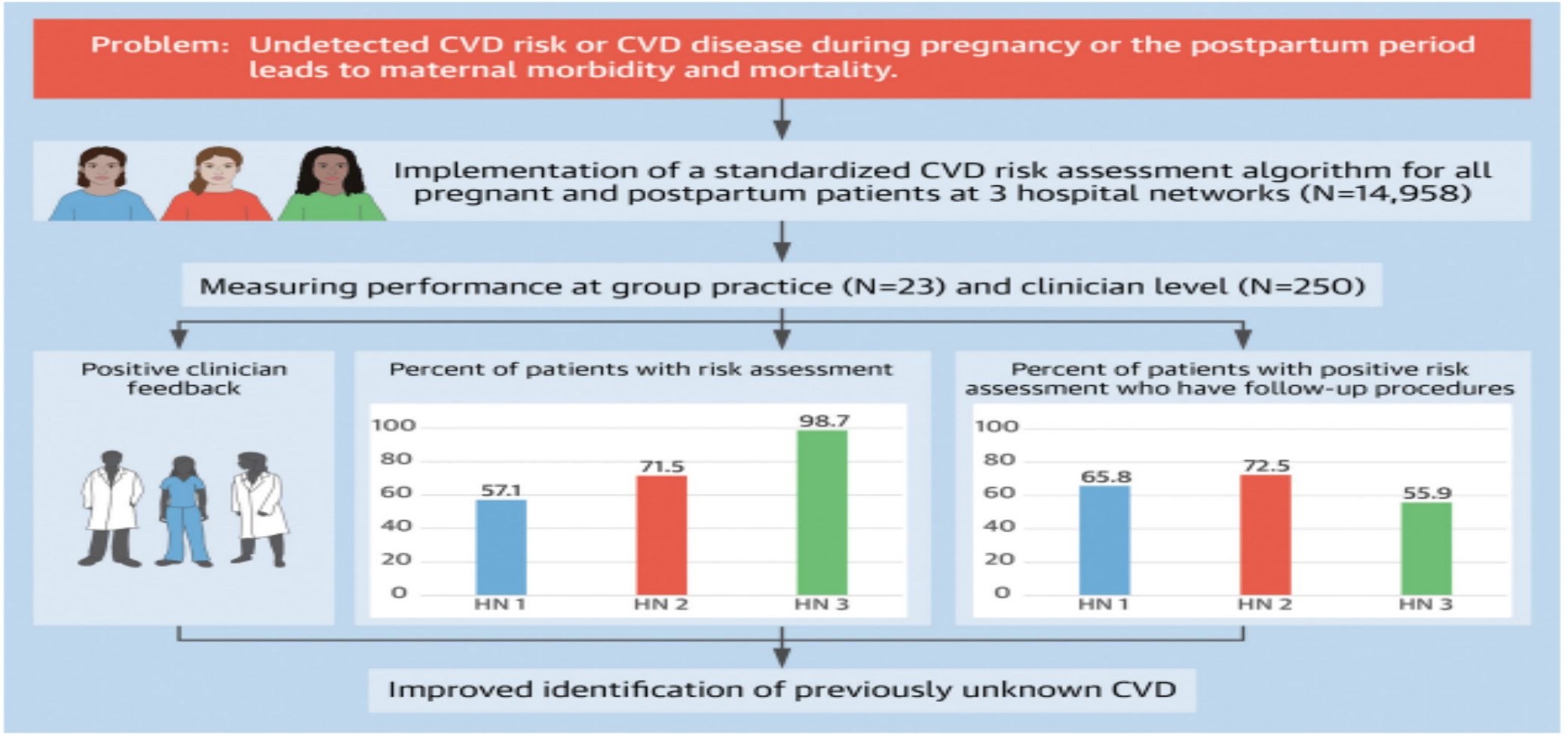
Thank you for helping us with quality improvement

**CENTRAL ILLUSTRATION** Early Recognition of CVD Using Risk Assessment Measures




Hameed AB, et al. JACC Adv. 2023;2(1):100176.

**CENTRAL ILLUSTRATION** Early Recognition of CVD Using Risk Assessment Measures




Hameed AB, et al. JACC Adv. 2023;2(1):100176.

# What to do with a "positive" screen

- Baseline assessment
  - CMP, BNP, consider TSH especially in patients with arrythmias, CBC
  - ECG, ECHO, event monitoring, if applicable
  - Don't forget to screen for substance use

# Further evaluation

- Referral to cardiology for abnormal initial testing
  - Consider stress testing
- Event monitoring for arrythmias
- Consider treatment of anemia
  - Some data suggest ECG changes and tachycardia in 90% of patients with anemia

Tangeda PR et al. Maternal Myocardial Performance in Second Trimester of Pregnancy With Iron Deficiency Anaemia. J Clin Diagn Res. 2016 Mar;10(3):

# HELP, IT IS GOING TO TAKE 9 MONTHS FOR THE EMR BUILD

**Cardiovascular Screening Tool**

Completing Provider: Date:

**STEP 1: Enter a 1 for each of the following that are positive:**

| **Vital Signs** | |
|---|---|
| Resting HR ≥ 110 | |
| SBP ≥ 140 | |
| Respiratory Rate ≥ 24 | |
| SpO2 ≤ 96% | |
| | |
| **Vitals Total Score:** | |

| **Symptoms** | |
|---|---|
| Shortness of Breath | |
| Orthopnea | |
| Syncope | |
| Dizziness | |
| Palpitations | |
| Chest Pain | |
| Asthma unresponsive to therapy | |
| **Symptoms Total Score:** | |

| **Risk Factors** | |
|---|---|
| Age ≥ 40 | |
| African American | |
| Pre-Pregnancy BMI ≥ 35 | |
| Pre-existing Diabetes | |
| Chronic HTN | |
| Hx of Chemotherapy | |
| Substance use<br>Cigarettes/Vaping<br>THC<br>EtOH | |
| **Risk Factors Total score:** | |

**STEP 2: Is each category's total score ≥ 1?** (Circle one) No Yes

**STEP 3: Add scores:** Vitals + Symptoms + Risk Factors = ___ → **Total ≥ 4?** (Circle one) No Yes

**STEP 4: Heart and Lung Exam. Loud Murmur or Basilar Crackles?** (Circle one) No Yes

** **If YES to Step 4, Order STAT MFM Consult** ☐ (MFM will handle ECHO, ECG, Cardiology referral)

**STEP 5:** If **YES** to Step 2 **OR** 3, Order: **BNP** ☐ **ECG** ☐ **ECHO** ☐

If patient **endorses palpitations**, order: **TSH** ☐ **CBC** ☐ **ECG** ☐ (if not planned)

**STEP 6: In the chart sticky note, write "CVS Tool completed <date>"** ☐

**Return form to MA scanning box** ☐

# Things we have done well

- Screening tool in a hard stop
- Education of providers so that work up is performed prior to being referred to cardiology
- Increased awareness of CVD disease in this patient population
- Developed tools in all of our obstetrical hospitals regardless of level

# Things I wish I would have done

- Made the screen positive fire to the chart as a notification
  - Relying on human communication can mean that a positive screen is not conveyed
- Built an order set that automatically triggered with a positive screen
- Included the ED in the screening process
  - Hazard of a larger center


Key Metrics & Reporting
Analysis & Understanding
Modeling & Planning
Decisive Action
Continuous Improvement Cycle

# Case Discussion

- Emphasizing importance of CVD screening

# QUESTIONS?

## Bridgette Schulman, PhD, RNDC-OB, C-EFM, CPPS

Clinical Outreach, HOPE for Georgia Moms
State Maternal Health Innovation Program
Northeast Georgia Health System

# EHR Integration of the Maternal Cardiac Conditions Risk Assessment: Hospital Approaches to Support Buy-in for Builds

**Bridgette Schulman, PhD, RNC-OB, C-EFM, CPPS**
Clinical Outreach, HOPE for Georgia Moms
State Maternal Health Innovation Program
Northeast Georgia Health System

February 6, 2024

# HOPE for Georgia Moms

## Healthy Outcomes and Positive Experiences

EQUITABLE EXPERIENCES | ACCESSIBLE CARE | THRIVING MOMS

- Grant from Health Resources and Services Administration (HRSA) and administered by NGHS
- One of 9 states in U.S. to receive grant, only health system
- Grant award period: 2022-2027 for $5 million
- Addressing gaps and needs in
  - Direct clinical care
  - Workforce training
  - Maternal health data enhancements
  - Community engagement
- Focus on Innovation and Equity in all strategies

HopeforGeorgiaMoms.org

HOPE FOR GEORGIA MOMS

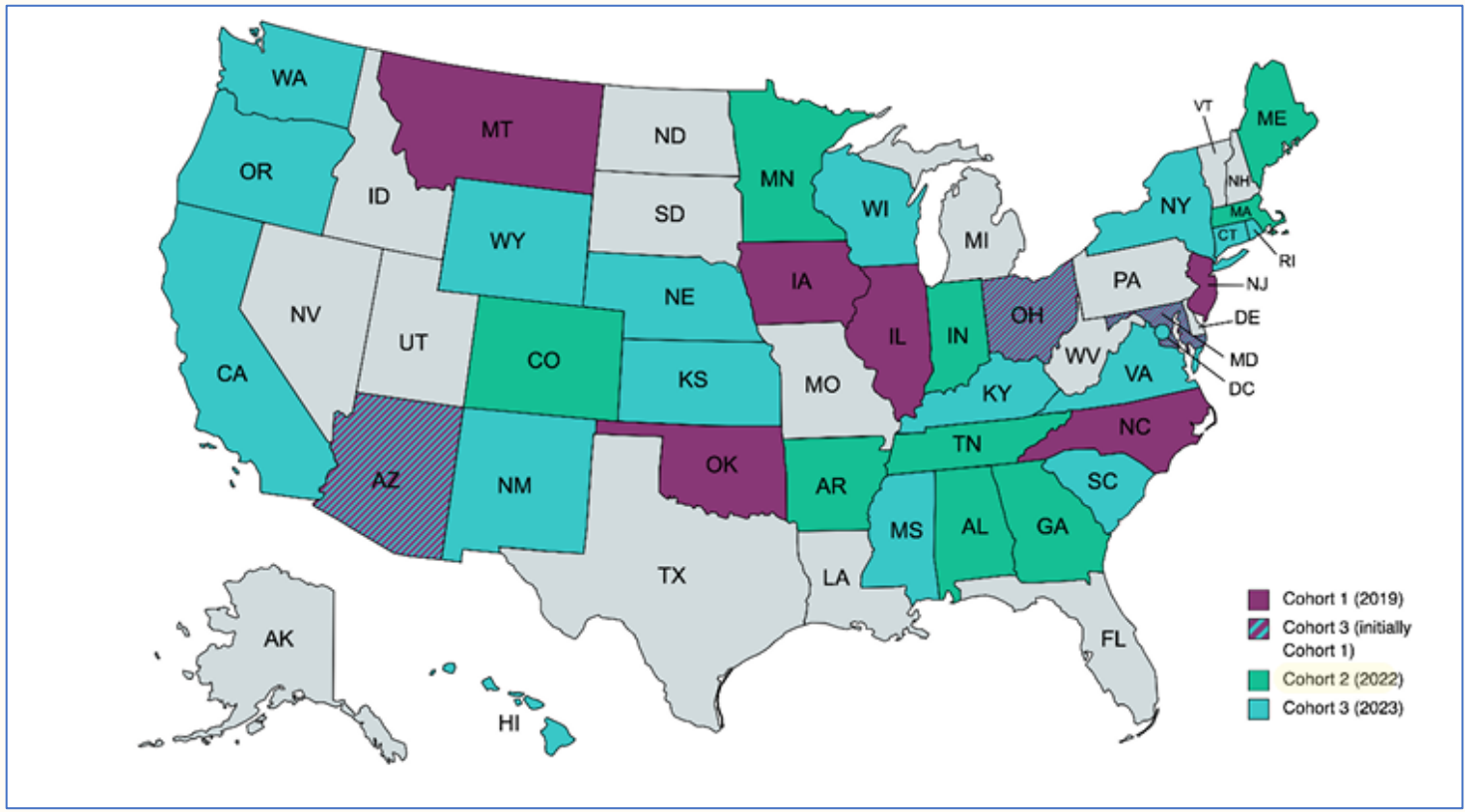
# NGHS Awarded Grant in 2022

Health Resources & Services Administration

HRSA Maternal & Child Health

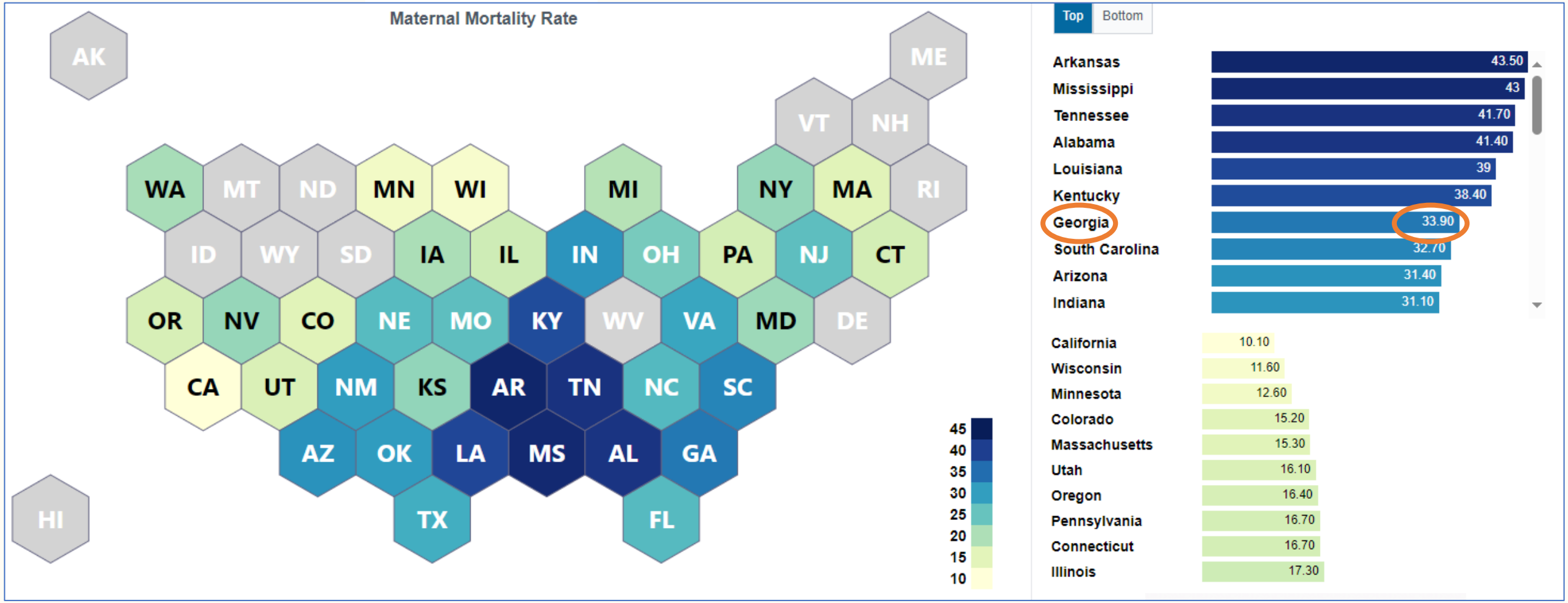
Cohort 2 (2022-2027):

- (AL) University of Alabama at Birmingham
- (AR) University of Arkansas System
- (CO) Colorado Dept. of Public Health and Environment
- (GA) Northeast Georgia Health System
- (IN) Indiana State Department of Health
- (ME) Maine Department of Health & Human Services
- (MA) Massachusetts Department of Public Health
- (MN) Minnesota Department of Health
- (TN) Tennessee Department of Health




**9 States in 2022 Cohort in Green**

# 2024 Maternal Mortality Rate in Georgia in Bottom 10

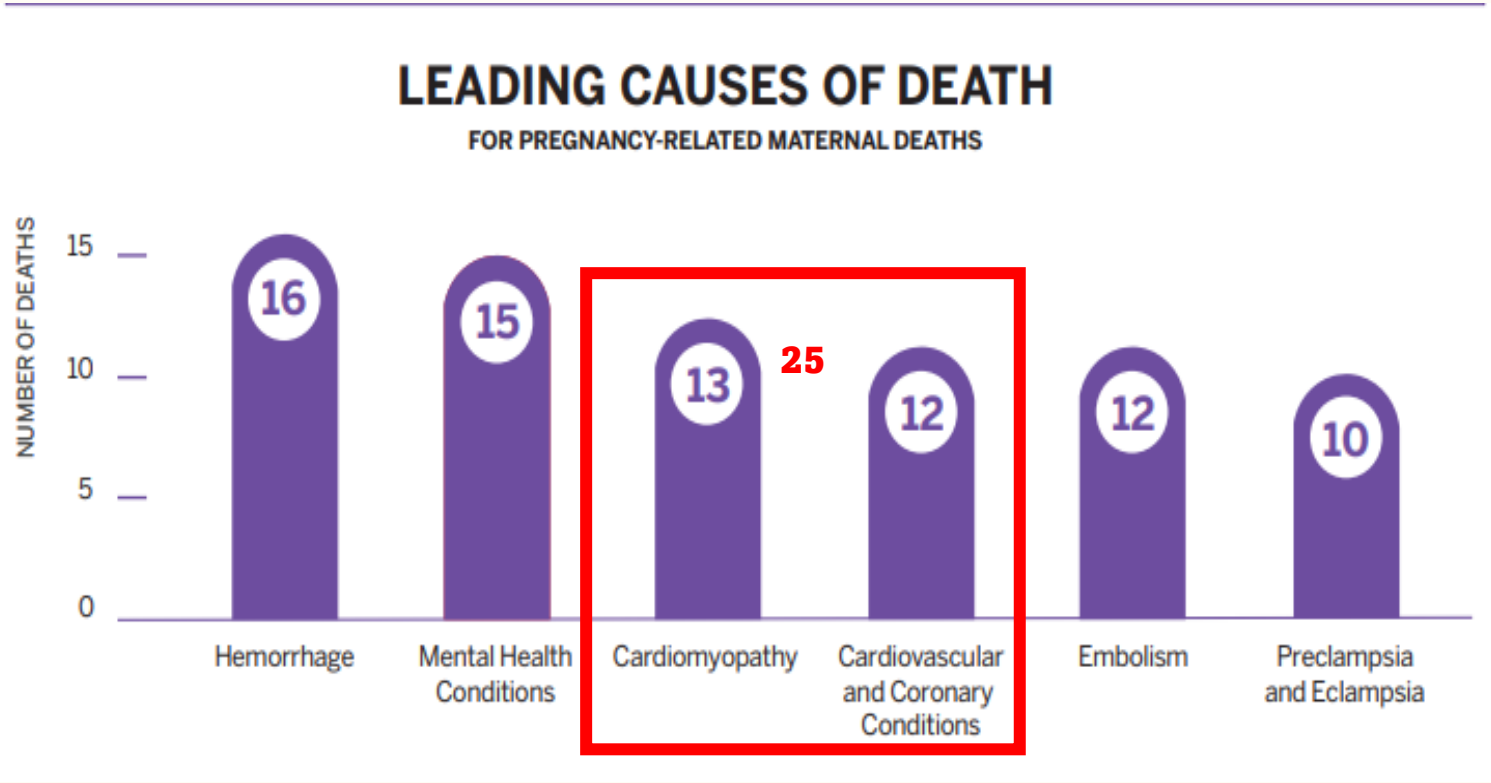



**Georgia's maternal mortality rate is 7th worst in nation at 33.9 per 100,00 live births; as compared to California at 10.1**

Sources: CDC 2018-2020; KFF 2018-2021 Maternal deaths and mortality rates per 100,000 live births

# Georgia Maternal Mortality Review Committee (MMRC) 2018-2020

- The leading causes of death were **hemorrhage, mental health conditions, cardiomyopathy, cardiovascular and coronary conditions, embolism, and preeclampsia and eclampsia**
- **Cardiovascular Disease** is a major contributor of Maternal Death
- Of the pregnancy-related deaths, **89% had at least some chance of being prevented**
- Inadequate screening and follow-up care of cardiovascular symptoms in pregnant and postpartum women contributed to mortality




Source: 2018 – 2020 Maternal Mortality Report, Georgia Department of Public Health

# Contributing Factors to CVD Morbidity/Mortality:

- Delayed/ inadequate response to clinical signs (61%)
- Ineffective or inappropriate treatment (39%)
- Misdiagnosis (37%)
- Failure to refer or consult (30%)

**Goal:** Reduce Severe Morbidity/ Mortality related to maternal cardiac conditions in Georgia

**GaPQC SMART AIM:** By 02/6/2026, National Wear Red Day, to reduce harm related to existing and pregnancy related cardiac conditions through the 4th trimester by 20%

| Key Drivers | | Interventions |
|---|---|---|
| **Readiness** | **Train all OB providers and nurses on sign/symptoms of Cardiac Conditions in Obstetrics P3** | **Develop and disseminate education on Signs/Symptoms of Cardiac Conditions and the use of CVD Risk Assessment to OB providers and nurses: report completion rate** |
| | Train all ED providers and nurses on sign/symptoms of Cardiac Conditions **P5** | Develop and disseminate education on Signs/Symptoms of Cardiac Conditions : report completion rate |
| | OB Provider and Nursing Education – Respectful and Equitable Care **P4** | |
| **Recognition** | Screen all woman who are pregnant and up to 365-day PP with CVD Risk Assessment **P1** | **Determine which screening tool will be used and train providers to use it** |
| | | Build in screening tool in EPIC and complete at points of entry in the healthcare system and construct a pathway to referral and embed in EHR |
| | **In all care environments (ED, urgent care, and primary care) assess and document if a patient presenting is pregnant or has been in last year S2** | **ED department has standardized screening for current pregnancy and pregnancy in the last year S2** |
| | Establish Multidisciplinary Care Plan Team for pregnant people with Cardiac Conditions **P2** | Establish coordination of appropriate consultation, co-management and/or transfer to appropriate level of maternal/newborn care |
| | | Utilize mWHO Cardiac Risk to communicate risk with those that have Cardiac Conditions and have treatment plans accessible in EPIC P1 |
| **Response** | Multidisciplinary team to respond to known or potential cardio-obstetric emergencies **S1** (Heart Team) | Develop protocol and escalation policy in accordance with maternal level of care with defined roles, triggers, treatment algorithms, and referral/follow-up plans |
| | **Provide patient education focused on postpartum complications, warning signs, and instructions on when to notify provider S3** | **AWHONN Post Birth Warning and PEACH Cards** |
| | | **Coordinate transitions of care including the discharge from the birthing facility to home and transition from postpartum care to ongoing primary and specialty care** |
| | Patient Event Debriefs **S5** | Have established standard process to conduct debrief with patients that experience severe events S5 |
| **Reporting** | Perform multidisciplinary review of serious complications to identify system issues **S4** | Have formal review following care of those at highest risk and those who experienced complications to assess alignment with standard policies and procedures and to identify opportunities for improvement |
| | Monitor Outcomes related to cardiac conditions and stratify by race/ethnicity | |
| | Report AIM CCOC outcomes data through GaPQC: Death r/t CC; SMM r/t CC; NTSV w/CC; PTB w/CC | Have a process in place to respond and implement recommended changes brought from review team |

# It Takes a Village

## The Obvious

- OB/GYN offices
- Cardiology offices
- Labor/Delivery
- Antepartum


## The Not So Obvious

- Emergency Department
- Urgent Care
- Paramedics/EMT
- ICU/Critical Care

# Identify Your Team

**Laura Divoky, MD**

Director of Women‘s Heart Center, Georgia Heart Institute

**Savannah Sanders, PA-C**

Women‘s Heart Center Coordinator, Georgia Heart Institute

**Maya Watford, PharmD**

Women‘s Heart Center Parmacist, Georgia Heart Institute

**Tina Johnson, RN-MSN, CEN, CPEN, CFRN, SCRN, CMTE**

Emergency Services PI Coordinator

**Kathryn West, MD**

Assoc. Program Director Emergency Medicine Residency, GA Emergency Department Services

**Parker Long, DO**

Physician for Obstetrics and Gynecology

# Focus on Recognition: CVD Screening

| Key Drivers | | Interventions |
|---|---|---|
| **Recognition** | Screen all woman who are pregnant and up to 365-day PP with CVD Risk Assessment **P1** | **Determine which screening tool will be used and train providers to use it** |
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| | Establish Multidisciplinary Care Plan Team for pregnant people with Cardiac Conditions **P2** | Establish coordination of appropriate consultation, co-management and/or transfer to appropriate level of maternal/newborn care |
| | | Utilize mWHO Cardiac Risk to communicate risk with those that have Cardiac Conditions and have treatment plans accessible in EPIC P1 |

# Key Points for a CVD Risk Assessment

**Screen**

- Using a standardized, validated tool to help identify birthing people at increased risk of CVD during pregnancy and 365 days postpartum

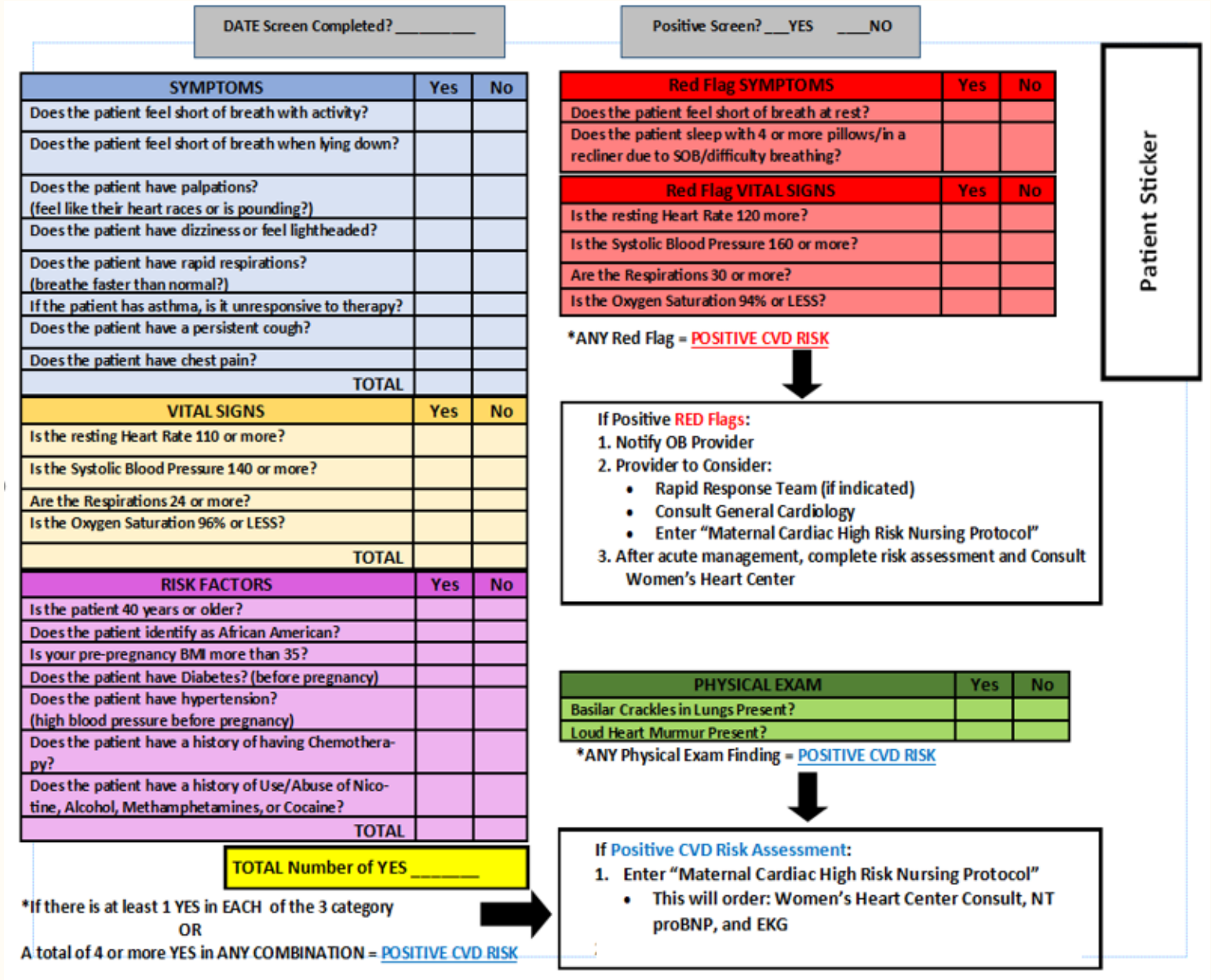
**Recognize**

- Recognize those that screen “at risk” for CVD and have a standardized process for follow up

**Refer**

- Refer those that screen “at risk” to Cardiology so they get the treatment and support to prevent further complications

# Paper CVD Risk Assessment



DATE Screen Completed? _____

Positive Screen? ___YES ___NO

| SYMPTOMS | Yes | No |
|---|---|---|
| Does the patient feel short of breath with activity? | | |
| Does the patient feel short of breath when lying down? | | |
| Does the patient have palpations? (feel like their heart races or is pounding?) | | |
| Does the patient have dizziness or feel lightheaded? | | |
| Does the patient have rapid respirations? (breathe faster than normal?) | | |
| If the patient has asthma, is it unresponsive to therapy? | | |
| Does the patient have a persistent cough? | | |
| Does the patient have chest pain? | | |
| TOTAL | | |

| VITAL SIGNS | Yes | No |
|---|---|---|
| Is the resting Heart Rate 110 or more? | | |
| Is the Systolic Blood Pressure 140 or more? | | |
| Are the Respirations 24 or more? | | |
| Is the Oxygen Saturation 96% or LESS? | | |
| TOTAL | | |

| RISK FACTORS | Yes | No |
|---|---|---|
| Is the patient 40 years or older? | | |
| Does the patient identify as African American? | | |
| Is your pre-pregnancy BMI more than 35? | | |
| Does the patient have Diabetes? (before pregnancy) | | |
| Does the patient have hypertension? (high blood pressure before pregnancy) | | |
| Does the patient have a history of having Chemotherapy? | | |
| Does the patient have a history of Use/Abuse of Nicotine, Alcohol, Methamphetamines, or Cocaine? | | |
| TOTAL | | |

TOTAL Number of YES _____

*If there is at least 1 YES in EACH of the 3 category
OR
A total of 4 or more YES in ANY COMBINATION = POSITIVE CVD RISK

| Red Flag SYMPTOMS | Yes | No |
|---|---|---|
| Does the patient feel short of breath at rest? | | |
| Does the patient sleep with 4 or more pillows/in a recliner due to SOB/difficulty breathing? | | |

| Red Flag VITAL SIGNS | Yes | No |
|---|---|---|
| Is the resting Heart Rate 120 more? | | |
| Is the Systolic Blood Pressure 160 or more? | | |
| Are the Respirations 30 or more? | | |
| Is the Oxygen Saturation 94% or LESS? | | |

*ANY Red Flag = POSITIVE CVD RISK

If Positive RED Flags:
1. Notify OB Provider
2. Provider to Consider:
   - Rapid Response Team (if indicated)
   - Consult General Cardiology
   - Enter "Maternal Cardiac High Risk Nursing Protocol"
3. After acute management, complete risk assessment and Consult Women's Heart Center

| PHYSICAL EXAM | Yes | No |
|---|---|---|
| Basilar Crackles in Lungs Present? | | |
| Loud Heart Murmur Present? | | |

*ANY Physical Exam Finding = POSITIVE CVD RISK

If Positive CVD Risk Assessment:
1. Enter "Maternal Cardiac High Risk Nursing Protocol"
   - This will order: Women's Heart Center Consult, NT proBNP, and EKG

Patient Sticker

## Symptom, Vital Signs, and Risk Factor Categories:

Positive Screen is when:

- One YES in EACH CATEGORY (Symptoms, Vital Signs, Risk Factors)

OR

- YES to 4 or more in any combination of CATEGORY

## Physical Exam:

Positive Screen is when:

- One YES in Physical Exam

## RED Flags

Positive Screen is when:

- YES to ANY RED FLAGS

# The Who, When and Where: Paper Version

Complete paper CVD risk assessment during morning assessment the morning after delivery

If the screen scores “At Risk”:

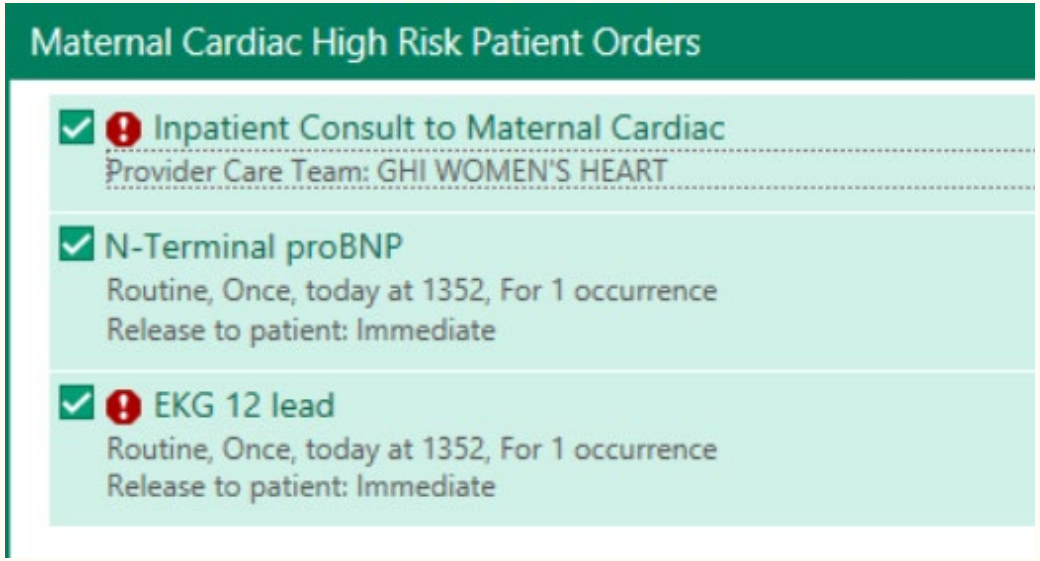
- Enter the “Maternal Cardiac High Risk Nursing Protocol”

Place the paper CVD risk assessment on the chart

When the chart is ready to be sent down to medical record:

- Send the original down with the chart and uploaded to medical record

# Have a Standard Process for “At Risk” Screens



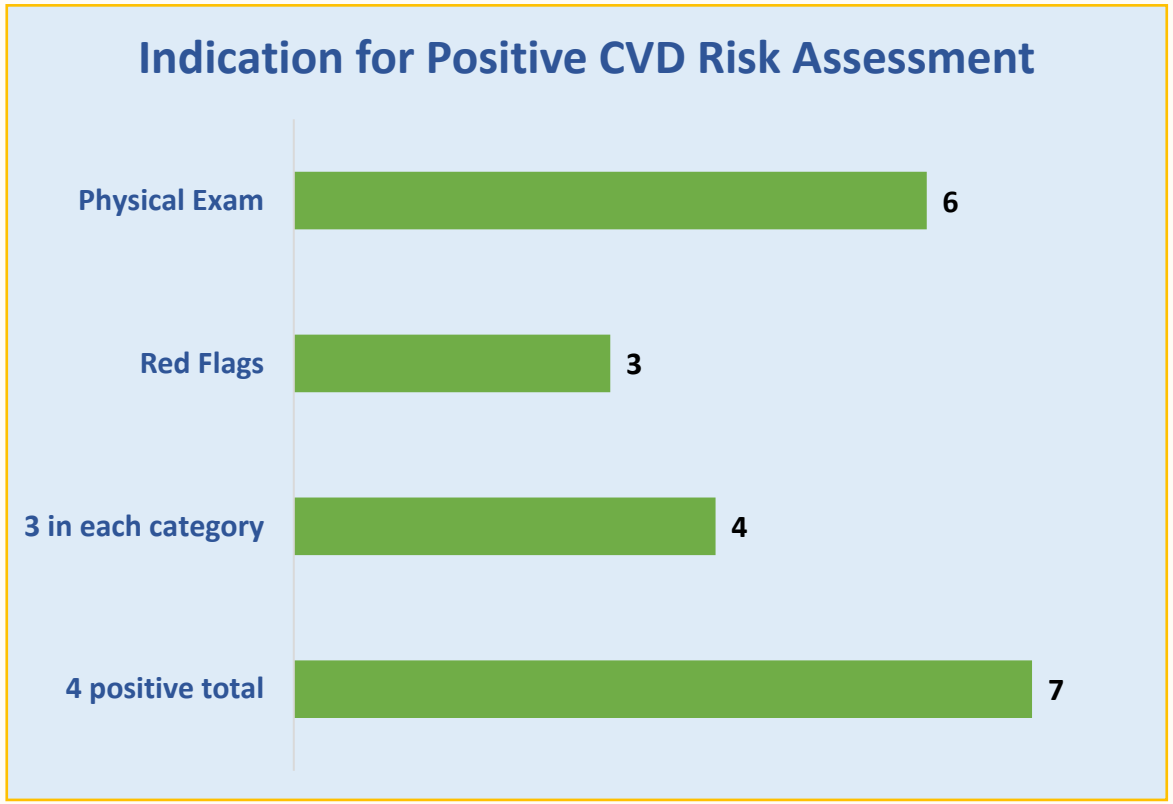

1. If the patient’s screen calculates “At Risk” then the provider will enter the “Maternal Cardiac High Risk Order Panel”
2. The <u>NURSING PROTOCOL</u> order panel includes:
   a. Consult to Women’s Heart Center Cardiology
   b. NT proBNP
   c. EKG

# Statistics for Paper CVD As of 12/5/2023

Paper Risk Assessment went Live 8/8/2023

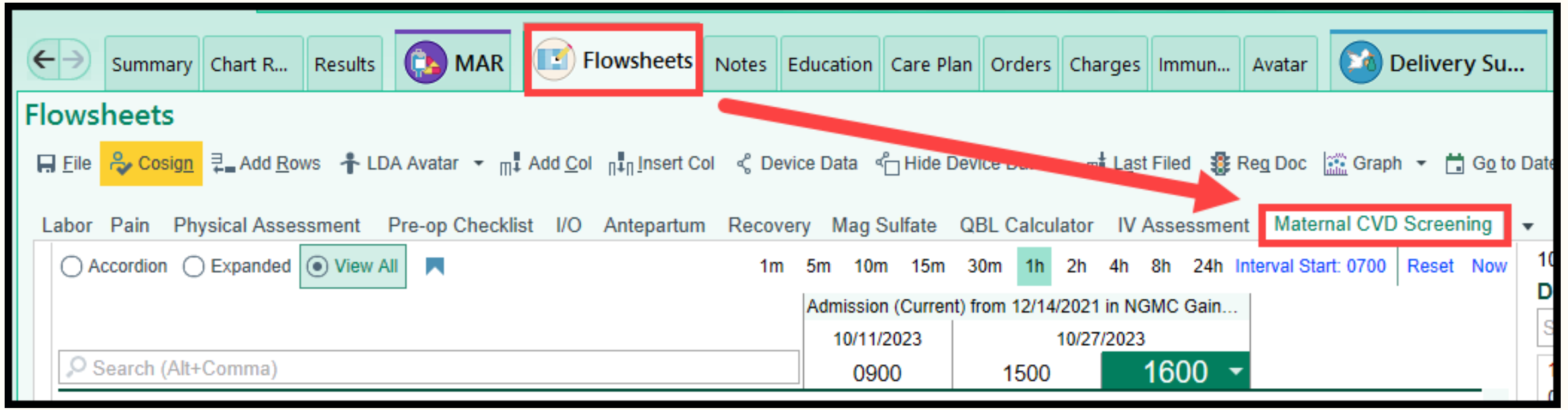
- Total screened 444
- 20 screened positive
- Positive Screen = 4.4 %

- 3 additional consults placed w/out “at risk” screen for clinical history/condition
- Highest positive factors
  - BMI>/+ 35 (23%)
  - African American (11%)
  - SUD (11%)
- Increased provider awareness led to additional 56 ambulatory referrals



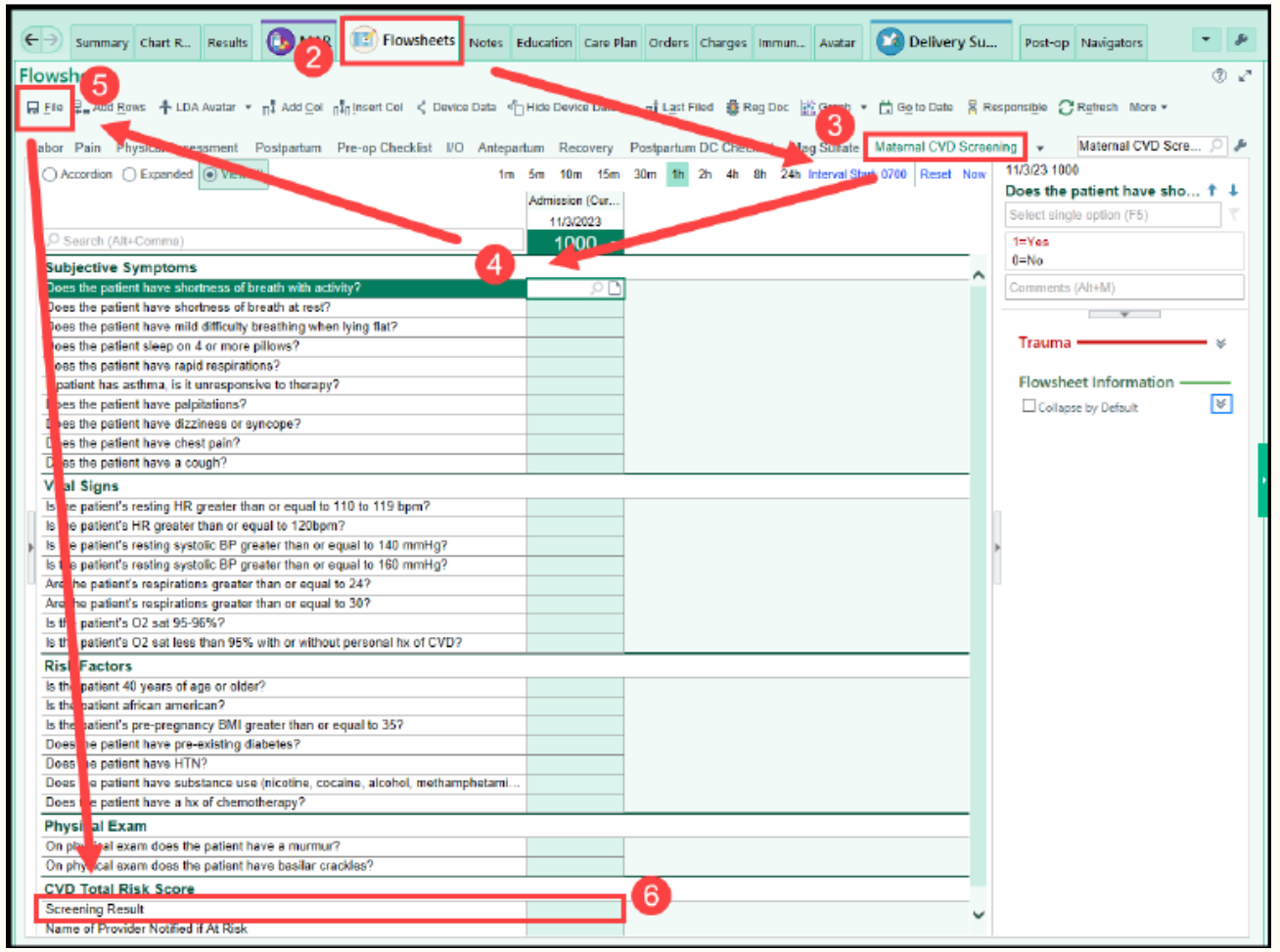
# CVD Risk Assessment in EPIC

1. Open the patient's chart.
2. Open the **Flowsheet** activity.
3. Select the **Maternal CVD Screening** template.



# CVD Risk Assessment in EPIC

1. Answer all questions on the screening template.
2. You MUST select **FILE** for the CVD risk assessment to calculate.
3. The screening result will auto populate “Not at Risk” or “At Risk
   - If a screening result does not auto populate make sure all questions are answered.
4. If patient is “At risk”, enter the name of the provider notified.

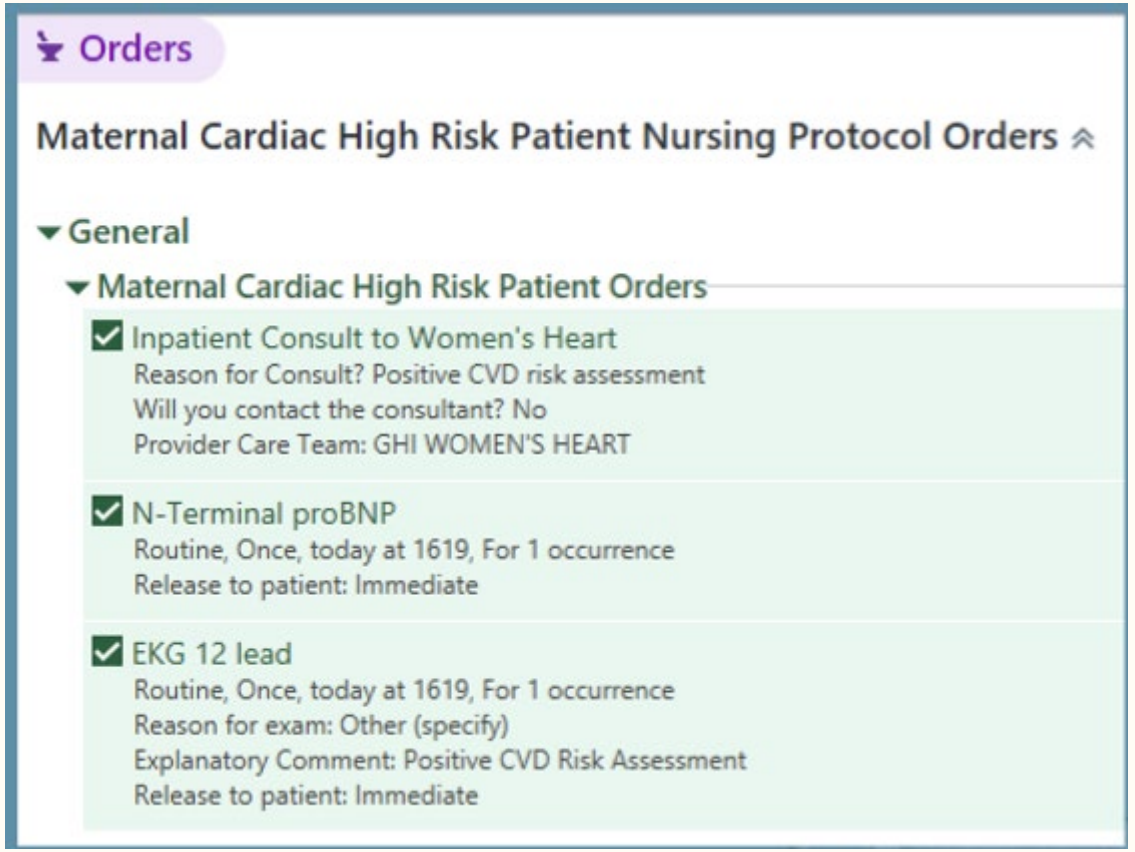



| CVD Total Risk Score | |
|---|---|
| Screening Result | Not at risk |
| Name of Provider Notified if At Risk | |

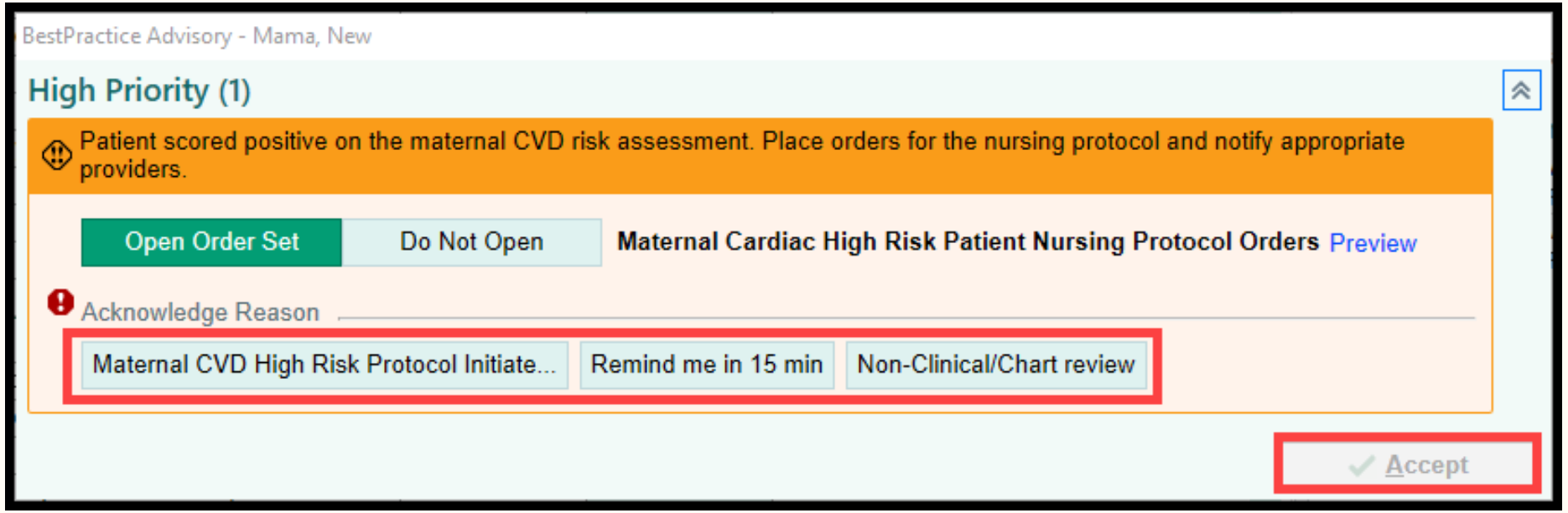
# Nursing Protocol Order for Positive CVD Risk Assessments

RN to place the “Maternal Cardiac High Risk Patient Nursing Protocol”

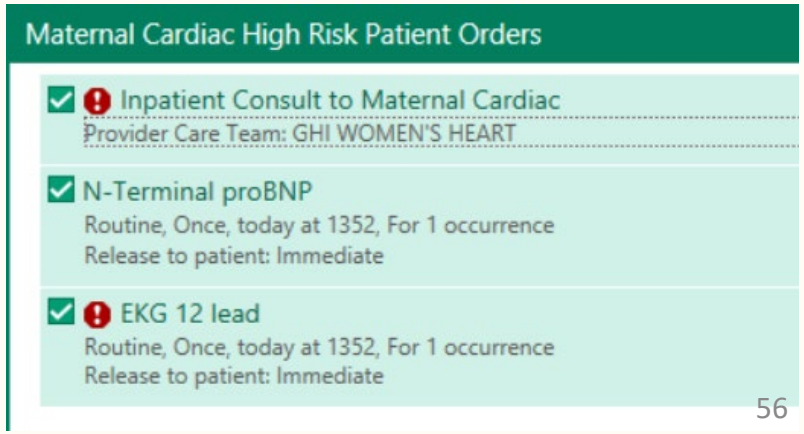
- This will Order:
  - Consult to Women’s Heart Center
  - proBNP lab
  - EKG



# Maternal CVD Risk Assessment BPA in EPIC: Nurses



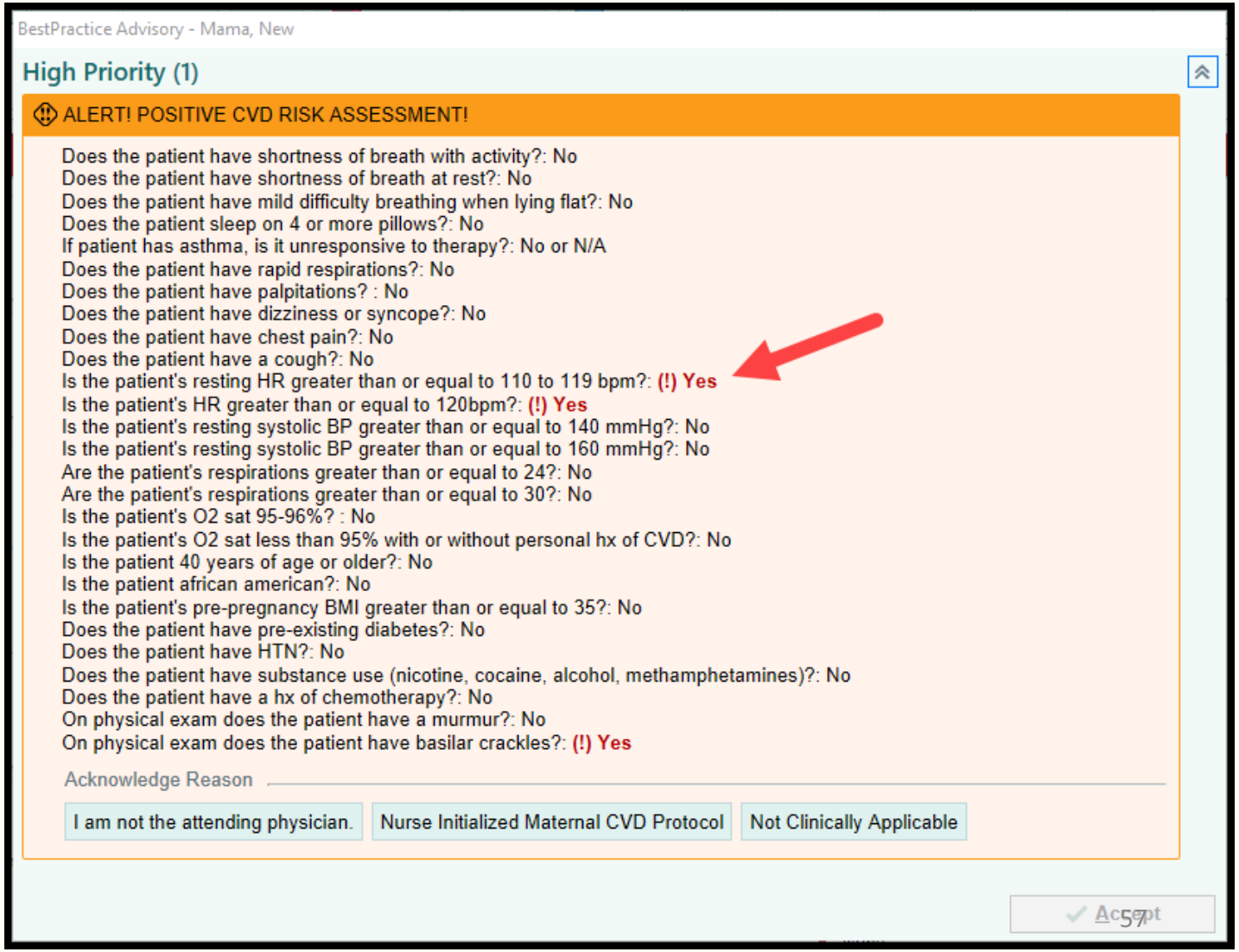

1. If the patient's screen calculates "At Risk"- a BPA will open.
2. When the BPA opens, the RN will select an acknowledge reason and Open Order Set
   - The Nursing protocol will open right from BPA
3. Click **Accept**.



# Maternal CVD Risk Assessment BPA in EPIC: Providers

- If a patient's screen calculates "At Risk" on the Maternal CVD Screening tool- a BPA will open when the provider opens the patient's chart
- Provider will select an acknowledge reason and click "Accept"

Note: The positive answer from the screening tool will show in red.



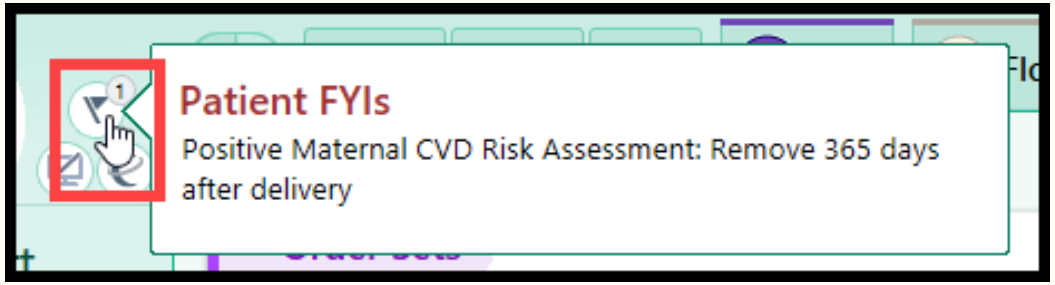
# Maternal CVD Risk Assessment FYI Flag

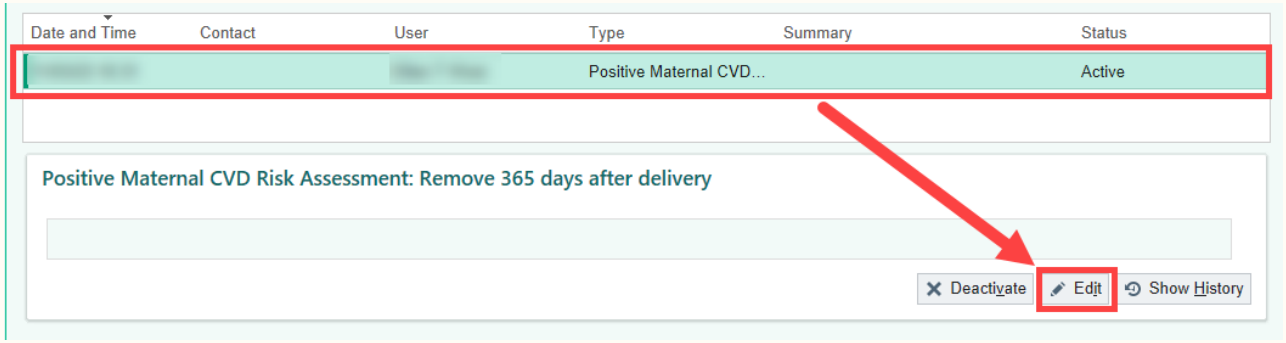
If the patient triggers **“At risk”** an FYI flag will be added in the top right-hand corner of the storyboard.

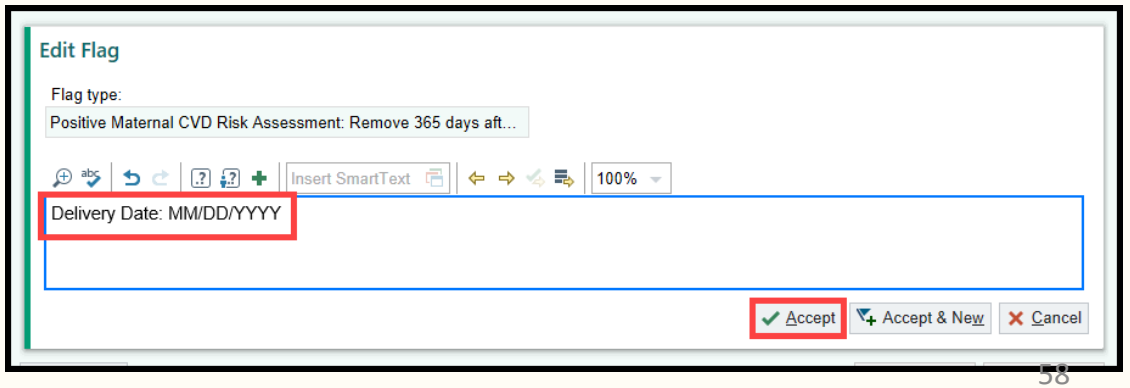
- The flag indicates that the patient has a Positive CVD Risk Assessment and will increase awareness throughout other applications in EPIC
- Once the patient has delivered, the patient’s delivery date needs to be added to flag.

Follow the steps below to update the flag.

1. Select the flag in the patient’s storyboard
2. Click on the flag and select EDIT
3. Enter **Delivery Date: Month/Date/Year** and click **Accept**.



# The Who, When and Where: EPIC Version

**Complete CVD risk assessment in EPIC during morning assessment the morning after delivery**

- FILE the CVD Risk Assessment and review the results
- The nurse and provider will receive a BPA

**If the screen scores "At Risk":**

- Enter the "Maternal Cardiac High Risk Nursing Protocol"

**Notify the OB Provider and WHC PA of "At Risk" Score**

**An FYI flag will be created for all patients that score "At Risk"**

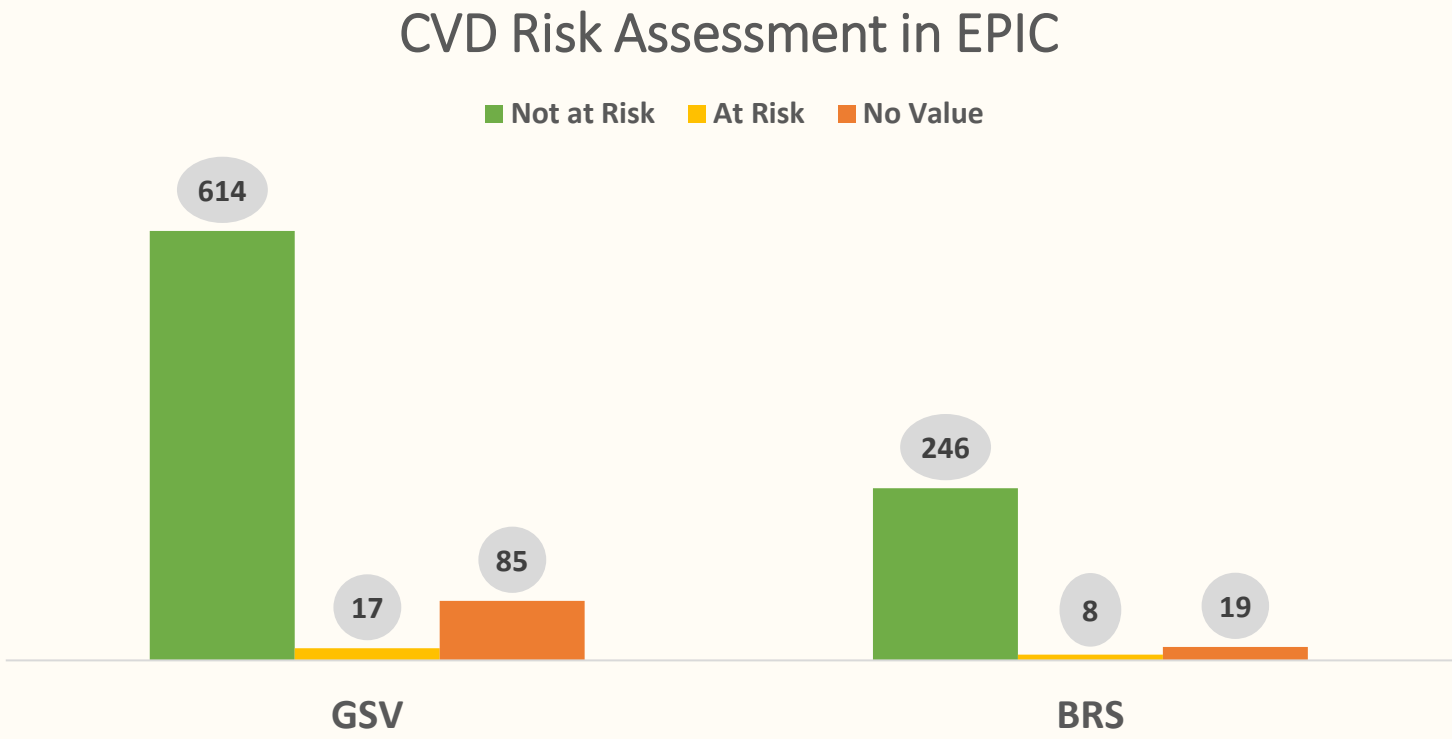
- Enter date of delivery under the FYI flag prior to discharge home

# EPIC Integrated CVD Risk Assessment

As of 2/4/2024

Gainesville
- Total Screened: 631
- Total Positive: 17
- Positive Rate = 2.7 %

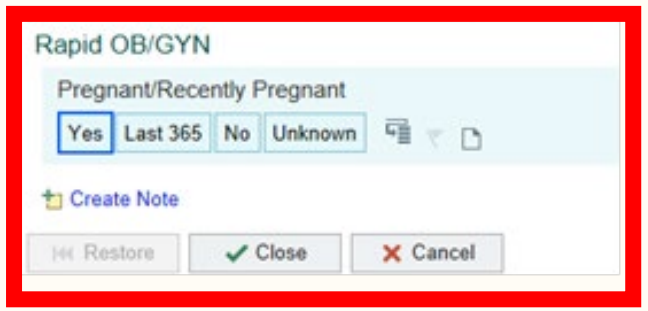
Braselton
- Total Screened: 254
- Total Positive: 8
- Positive Rate = 3.1 %




**Women screened after delivery for CVD risk**

# Focus on Recognition

| Key Drivers | | Interventions |
|---|---|---|
| **Recognition** | Screen all woman who are pregnant and up to 365-day PP with CVD Risk Assessment **P1** | **Determine which screening tool will be used and train providers to use it** |
| | **In all care environments (ED, urgent care, and primary care) assess and document if a patient presenting is pregnant or has been in last year S2** | Build in screening tool in EPIC and complete at points of entry in the healthcare system and construct a pathway to referral and embed in EHR |
| | Establish Multidisciplinary Care Plan Team for pregnant people with Cardiac Conditions **P2** | **ED department has standardized screening for current pregnancy and pregnancy in the last year S2** |
| | | Establish coordination of appropriate consultation, co-management and/or transfer to appropriate level of maternal/newborn care |
| | | Utilize mWHO Cardiac Risk to communicate risk with those that have Cardiac Conditions and have treatment plans accessible in EPIC P1 |




Additional Question Added in ED triage Navigator

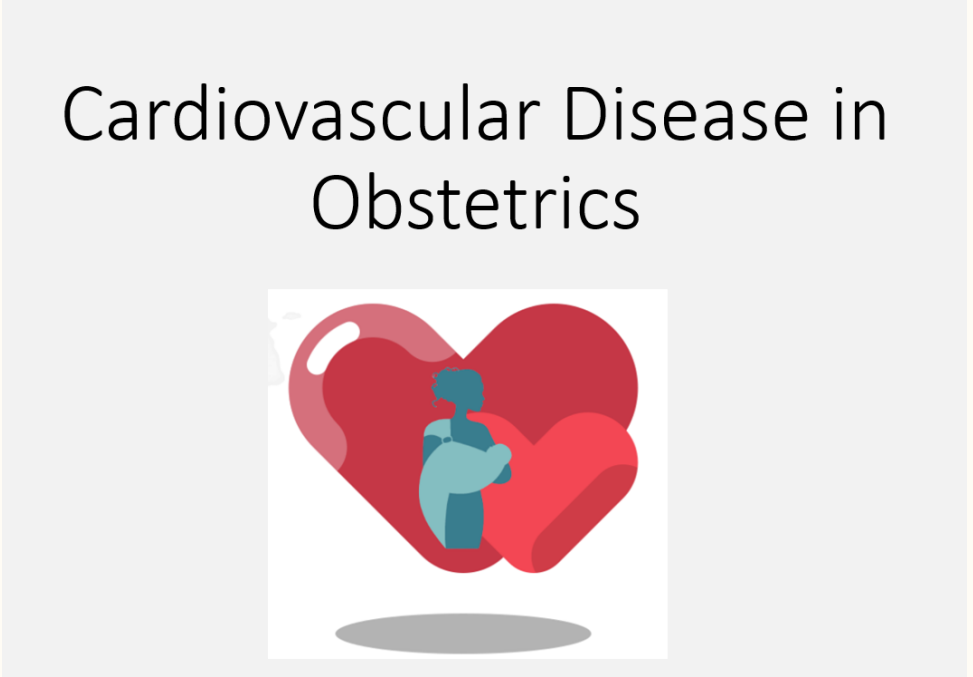
# Focus on Readiness: Education on Sign/Symptoms of Cardiac Condition in OB

| Key Drivers | | Interventions |
|---|---|---|
| **Readiness** | **Train all OB providers and nurses on sign/symptoms of Cardiac Conditions in Obstetrics P3** | **Develop and disseminate education on Signs/Symptoms of Cardiac Conditions and the use of CVD Risk Assessment to OB providers and nurses: report completion rate** |
| | Train all ED providers and nurses on sign/symptoms of Cardiac Conditions **P5** | |
| | OB Provider and Nursing Education – Respectful and Equitable Care **P4** | Develop and disseminate education on Signs/Symptoms of Cardiac Conditions : report completion rate |

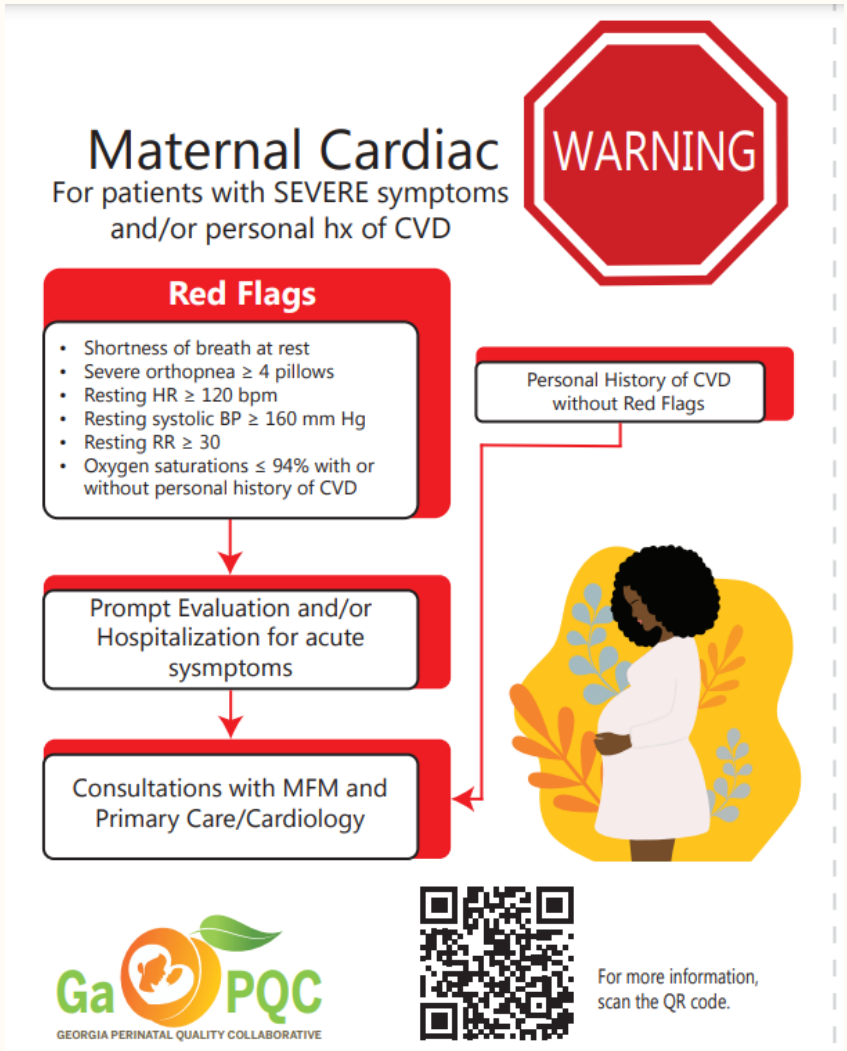
# Education Before Go-Live

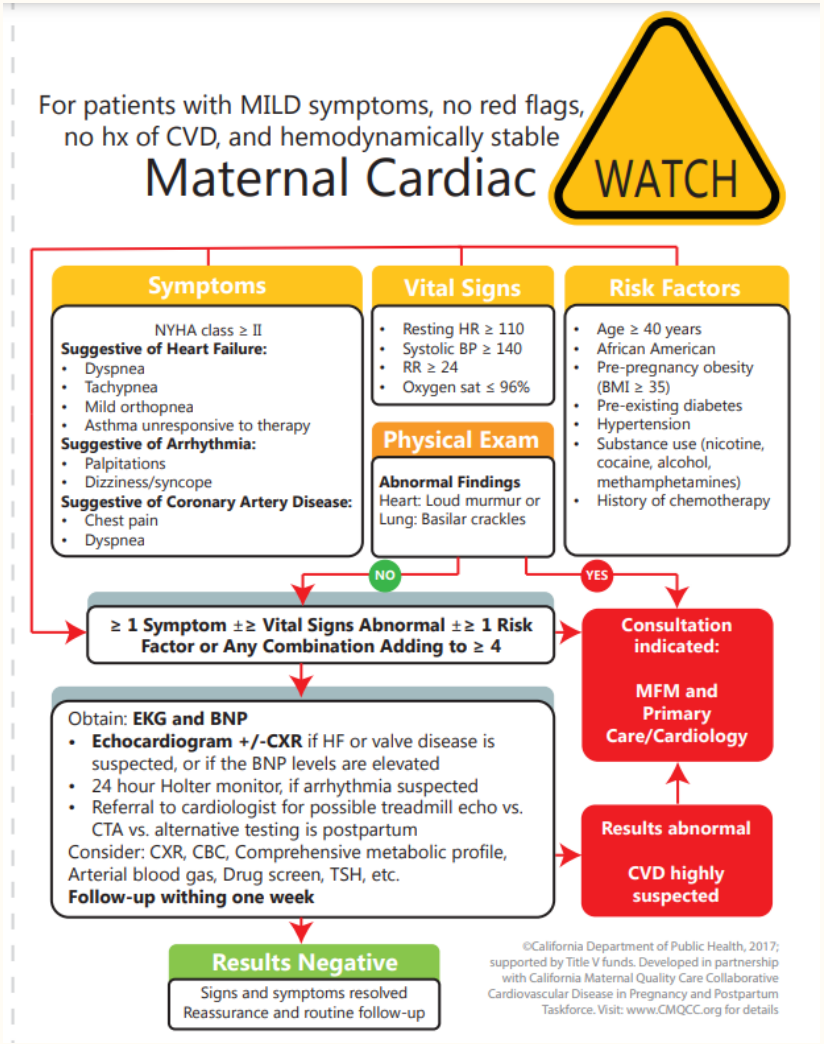
Created a Cardiac Conditions Learning Module

- Reviewed Sign/Symptoms of Cardiac Conditions
- Background on the CVD Risk Assessment and how to complete it
- Assigned through organizations Learning system to all
  - OB providers
  - OB nurses
- Other Education Modules available:
  - AWHONN CCOE: Cardiac Conditions



# Tools for CVD Screening from Georgia Perinatal Quality Collaborative (Ga PQC)



# Tools for CVD Screening from Georgia Perinatal Quality Collaborative (GaPQC)

## PEACH

### Pregnant and Postpartum Heart Disease Warning Signs

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**P** alpitations
Heart beating too fast or skipping beats

**E** dema
Swelling in your hands or feet

**A** bnormal Breathing
Hard time catching your breath

**C** hest Pains

**H** igh Blood Pressure

Georgia cares about the heart health of pregnant and postpartum people. Look out for the **PEACH** heart warning signs that something might be seriously wrong.

Pregnancy can impact your heart health for up to a year after the pregnancy ends. Not all doctors will know that you were pregnant. Remember to say ***"I was pregnant this past year and now I am having..."***

Use this QR code to get more information about heart health warning signs.

## Aortopathies

| | |
|---|---|
| RECOMMEND AVOIDANCE OF PREGNANCY | •Marfan Syndrome, Loeys-Dietz, or Other Hereditary Thoracic Artery Disease: Aortic Dilation >45 mm<br>•Bicuspid aortic valve: Aortic Dilation > 50 mm<br>•Turner: Aortic Size Index >25 mm/m2<br>•Vascular Ehlers-Danlos<br>•Severe coarctation<br>•Prior aortic dissection |
| PATHOPHYSIOLOGY | •Hormonal and hemodynamic changes of pregnancy increase risk of aortic dissection.<br>•Dissection can occur at any point in pregnancy with highest risk in third trimester and postpartum |
| CLINICAL PRESENTATION | Aortic Dissection-Surgical Emergency<br>• Abrupt, acute onset pain in the chest or back (90%).<br>• Symptoms correlate with the involved segments of the aorta.<br>• Red flags: Aortic dimension reaches threshold (Aortic size is the major determinant of risk -10% risk if aortic root diameter > 40mm), personal/family hx aortic dissection, rapid enlargement >5mm/year |
| IMAGING | •Transthoracic echocardiogram (TTE)<br>•Computed Tomographic Angiography (CTA) or Magnetic Resonance Angiography (MRA) to evaluate entire aorta. Can use gadolinium as benefit outweighs risk.<br>•Transesophaheal Echocardiography (TEE) when needed to assess valvular pathology. |
| ANTEPARTUM | •TTE every 4-12 weeks during pregnancy and 6 months postpartum<br>•If unable to visualize aortic dilatation, recommend serial monitoring with MRI (without gadolinium)<br>•Beta-blockers during pregnancy<br>•Serial monitoring for fetal growth<br>•Strict blood pressure control (goal BP <120/80 mmHg)<br>•Multidisciplinary team at tertiary center recommended<br>Type B- conservative managment: TEVAR considered in select cases;<br>Serial TTE q 4-12w<br>**OTHER COMORBIDITIES:**<br>Vascular EDS: Uterine rupture<br>Loeys-Dietz: Mitral regurgitation<br>Marfan Syndrome: Mitral regurgitation, Heart failure, Arrythmias<br>Turner Syndrome: Hypertension, DM, Bicuspid aortic valve, Coarctation<br>Bicuspid aortic valve: Aortic stenosis or regurgitation |
| MAINSTAY OF TREATMENT | • Avoid Hypertension<br>• Beta blockers to maintain strict BP control |
| OBSTETRIC MEDICATIONS TO AVOID OR USE CAUTION | **Use with Caution:**<br>•Magnesium Sulfate<br>•Oxytocin (no bolus, Use as dilute solution in IV infusion)<br>**Contraindicated:**<br>•Terbutaline<br>•Methylergonovine (Methergine)<br>•Carboprost tromethamine (Hemabate), avoid if vascular disease or aortic aneurysm<br>•Epinephrine, avoid with aortic disease, coronary dissection |
| BLOOD PRESSURE AND HEART RATE PARAMETERS | •2 large bore IV<br>•Continuous monitoring of heart rate and blood pressure<br>•Use of beta-blockers (Esmolol or Labetalol infusion)<br>•Heart rate: <60 beats per minute<br>•Systolic blood pressure: 100-120 mmHG<br>•If maximal beta-blockade, can use IV Nitroglycerin or Nicardipine to lower blood pressure |
| TIMING OF DELIVERY | If dissection: Type A >28 weeks>> CD first, then repair; if <28 wks repair alone |
| MODE OF DELIVERY | Vaginal delivery (Assisted-second stage if aorta ≤ stable during pregnancy;<br>Cesarean delivery: dilated aorta > 40mm, OB reasons, prior dissection repair, increasing size aorta during pregnancy. Delivery must be at place with CV surgery available; also consider antibiotics for risk of endocarditis |
| INTRAPARTUM | Strict BP and HR control, continue beta-blockers; Avoid pain, monitor for sx of aortic dissection |
| ANESTHESIA | •Slow dose epidural (Avoid CSE/Spinal)<br>•Avoid rapid drop in blood pressure and sympathetic blockade<br>•Evaluate for dural ectasia |
| POSTPARTUM | - Aortic dissection risk persists pp; - monitor for signs/sx; - continue B-blockers; clinical aortic f/u for 2-6 months (high-risk- weekly; low-risk- monthly) |
| REGIONAL ANESTHESIA- EPIDURAL and CSE/SPINAL | Optimal pain management; caution due to high prevalence of dural ectasia; >70% LDS and Marfans can have lumbosacral dural ectasia> increase CSF volume, risk of CSF leak w/ dural puncture |

## Pulmonary Artery Hypertension

| | |
|---|---|
| RECOMMEND AVOIDANCE OF PREGNANCY | ALL |
| PATHOPHYSIOLOGY | As PVR increases, PAP increases leading to RV failure and decreased CO leading to hypotension (this is when pts become symptomatic- CO drops and present w/SOB w/minimal exertion). Right atrial pressure (RAP) increases (due to "blown" tricuspid valve with regurgitation from RV back into RA). RV ischemia and dysfunction leads to fluid retention (impaired venous return) and DEATH! |
| CLINICAL PRESENTATION | Secondary causes: ASD, VSD, or PDA. Disease progression: exertional chest pain, peripheral edema, anorexia and/or early satiety, RUQ pain, ***EXERTIONAL SYNCOPE*** - prodrome to SUDDEN DEATH! - NOT RESUSCITATABLE! |
| IMAGING | - Need FULL 4-chamber TEE, need bubble study- look for "tunneled" ASD, also image first 2-3 cm IVC, image hepatic vein; need immediate right heart catheterization after diagnosis; limited right heart echo 1 week prior to delivery w/ volume assessment and imaging of IVC |
| ANTEPARTUM | - Manifests at 16-28w; esp. 24-28w; Hospitalize immediately if symptomatic! Can be deadly! Also consider chronic pulmonary emboli; |
| MAINSTAY OF TREATMENT | - Maintain afterload (Do NOT fluid overload) - Minimize PVR - Maintain adequate blood volume & venous return - avoid myocardial depressants (B-blockers) - Aggresive diuresis postpartum- NET negative 5-7 L by 72h pp |
| FLUID MANAGEMENT | Worsen b/c of fluid retention and overload with right heart dysfunction; Goal of management postpartum: aggressive diuresis. Use caution with diuresis if heart failure develops. |
| OBSTETRIC MEDICATIONS TO AVOID OR USE CAUTION | Terbutaline, avoid myocardial depressants (B-blockers), avoid oversedation (NO strong opioids). **AVOID carboprost (Hemabate)- it increases pulmonary artery pressure by over 100%!!!** |
| TIMING OF DELIVERY | 32 - 36 weeks |
| MODE OF DELIVERY | Controversial: VAGINAL Assisted second stage (valsalva may decrease preload), may need scheduled Cesarean Section to allow optimization with multidisciplinary teams |
| ANESTHESIA | Slow dose epidural (Avoid CSE/Spinal), Avoid rapid drop in blood pressure and sympathetic blockade |
| POSTPARTUM | Admit to CCU/ ICU/ strict I's &O's q4hrs x 72 hours/ start IV diuretic (IV lasix) immediately q 4h >> goal uop net negative 2 L by the time the epidural/spinal wears off then net neg 5-7L by 72 hours (c/s will take up to 5 days); limited R heart echo daily & once RV functioning properly and adequate diuresis, consider d/c home/ see in cardiology with R heart echo. HIGHEST RISK OF DEATH- PPD 3 - if not diuresed adequately as above >>> FULMINANT PULMONARY EDEMA >>> which can lead to DEATH!!! |
| REGIONAL ANESTHESIA- EPIDURAL | YES- MANDATORY- carefully titrate neuraxial anesthesia onset; avoid pain |
| REGIONAL ANESTHESIA- CSE/SPINAL | NO- avoid- rapid drop in bp; avoid rapid sympathetic blockade |

## Mitral Stenosis

| | |
|---|---|
| RECOMMEND AVOIDANCE OF PREGNANCY | Severe |
| PATHOPHYSIOLOGY | Increase in cardiac output leads to worsening of left sided stenotic lesions. 2 ways to decompensation and DEATH- 1. Increased blood volume leads to increase in left atrial pressure >> A.Fib and/or pulmonary edema >>DEATH! 2. Simultaneously fixed preload to LV leads to an inability to generate CO leading to cardiogenic shock and DEATH! |
| CLINICAL PRESENTATION | Rheumatic heart dz; Predictors of cardiac events: prior cardiac events, prior us of medication, pulmonary hypertension |
| IMAGING | echo to establish severity of stenosis and size of the left atrium; EKG to exclude atrial fibrillation, echo at least once/trimester (q 4-8 w for >mild MS or symptomatic) |
| ANTEPARTUM | Worsens from 23-34 weeks and then again immediately to 4 weeks postpartum. Complete TTE with full anatomic and hemodynamic assessment of the valves. Even worsening stenosis or heart failure usually responds well to medication and surgery not indicated. However, Severe rheumatic MS presents a significant risk of maternal adverse outcome during pregnancy. In asymptomatic women with severe rheumatic MS (mitral valve area ≤1.5 cm2, Stage C) and favorable valve morphology who are considering pregnancy, PMBC results in an increase in mitral valve area and reduction in transmitral gradient, which makes the patient more resilient to the hemodynamic load of pregnancy. Monitor BNP and pro-BNP levels correlate to mitral valve area as well as pulmonary artery pressure (normal BNP in pregnancy 30-60pg/mL, anything above 100 is concerning pro-BNP >300 concerning) |
| MAINSTAY OF TREATMENT | - Maintain normal HR- Avoid A.Fib - Prevent & monitor for pulmonary edema - Manage pulmonary edema - PP monitoring for pulmonary edema; Exercise restriction; Consider anticoagulation |
| FLUID MANAGEMENT | Avoid fluid overload; start diuretics to treat pulmonary edema |
| OBSTETRIC MEDICATIONS TO AVOID OR USE CAUTION | Terbutaline; tocolytics that can cause tachycardia |
| BLOOD PRESSURE AND HEART RATE PARAMETERS | Avoid tachycardia; avoid decreases in SVR/hypotension; Start beta blockers to maintain goal HR <100 (nodal blockade goal HR <80bpm; AVOID A-fib; Cardiovert new-onset A-fib; treat RVR |
| MODE OF DELIVERY | assisted vaginal delivery with regional anesthesia to avoid pain and increase in HR; cesarean only for obstetric indications |
| INTRAPARTUM | intra-arterial bp monitoring in labor/CD and 5-lead ECG; conitnuous pulse ox w/ waveform; labor in upright position |
| ANESTHESIA | Slow dose epidural (Avoid CSE/Spinal), Avoid rapid drop in blood pressure and sympathetic blockade |
| POSTPARTUM | 5-lead ECG with continuous pulse oximeter w/ waveform (monitoring closely for pulmonary edema); If pulmonary edema develops> diurese, supplemental O2, remain upright position; if necessary, intubate for controlled ventilation with PEEP |
| REGIONAL ANESTHESIA- EPIDURAL | Yes- avoid pain |
| REGIONAL ANESTHESIA- CSE/SPINAL | No- avoid- rapid drop in bp; avoid rapid sympathetic blockade |
| GENERAL ANESTHESIA | Be prepared for intubation and controlled ventilation with PEEP |

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# CARDIO-OB

## Quick Reference Guide

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## Cardiomyopathy/Heart Failure

| | |
|---|---|
| RECOMMEND AVOIDANCE OF PREGNANCY | Severe systemic left ventricular dysfunction (LVEF < 30%, NYHA III or IV) |
| PATHOPHYSIOLOGY | Impaired Systolic Function or Systolic Dysfunction (left ventricle) caused by Left Ventricular Hypertrophy creates reduced elasticity and compliance of LV, leading to decrease filling and emptying and therefore decrease cardiac output. Commonly caused by untreated HTN, Valve disease (esp Aortic Stenosis), Ischemic heart disease (CAD/MI), Arrythmias ( A Fib or tachycardia). Can have "Preserved EF" (compensated) or "Decreased EF"(decompensated). Can be genetic, caused by alcholism, drug use, previous myocarditis or chemotherapy. |
| CLINICAL PRESENTATION | Any history of arrythmia, valve disease or CAD/MI. Elevated BP readings or diagnosis of hypertension. Most normal pregnancy symptoms mimic those of cardiomyopathy/HF. Consistent complaints or worsening complaints of decreased exercise tolerance, swelling, fatigue, dyspnea, orthopnea, palpitations, dizzines, syncope. Greatest risk during delivery and PP to develop acute HF or PE (16-35% chance). EF <40% associated with 30-60% adverse events. Severe ventricular systolic dysfunction; Prior PPCM w/residual reduced LVEF systolic dysfunction; Fontan w/ reduced systemic ventricular systolic dysfunction and/or heart failure. PREGNANCY SPECIFIC RISK FACTORS: Advanced Maternal Age, Multifetal Gestation, African American, poor nutrition, Smoking, |
| IMAGING | TTE, EKG, Chest X-Ray. |
| ANTEPARTUM | Baseline EKG and TTE, consider HOLTER. Baseline Pro BNP (>450 pg/mL abnormal) and BNP (abnormal > 100 pg/mL). Monitor BNP levels each trimester . Anticoagulation with valve disease and arrhymias. If symptomatic and valve disease, use BB, lasix, CCB and verapimil. If still symptomatic consider early delivery. If symptomatic and no valve disease with EF<50% DO NOT USE BB, use hydralazine, lasix and nitrates. If symptomatic and no valve disease with EF >50% USE BB, verapamil, and lasix |
| MAINSTAY OF TREATMENT | Normal HR (avoid bradycardia- tx w/ ephedrine and glycopyrrolate prn) - Maintain afterload (avoid hypo/hypertension) - Maintain contractility -Beta Blockers (Metoprolol Succinate and Carvedilol) Digoxin (need fetal surveillance) and hydralazine - Prevent, monitor and manage pulmonary edema - Monitor for ischemia/arrythmia - Minimize PVR. Anticoagulant therapy |

## Cardiomyopathy/Heart Failure

| | |
|---|---|
| FLUID MANAGEMENT | Maintain afterload - Maintain normovolemia Will worsen condition, judicious use only. |
| OBSTETRIC MEDICATIONS TO AVOID OR USE CAUTION | *Non-dihydropyridine calcium channel blockers, *diltiazem, *verapamil, *carboprost (Hemabate). *Ibuprofen *Azithromycin *Celexa (doses greater than 40 mg) *Does Magnesium Sulfate decrease SVR in a way that could complicate Peripartum Cardiomyopathy or Heart Failure? Some research suggests that nifedipine and magnesium together could worsen heart failure. Use with caution. |
| BLOOD PRESSURE AND HEART RATE PARAMETERS | Between 110/70 to <140/90 mmHg. HR 60-110 AVOID: vasodilation, blood loss, hypotension, Valsalva, excess catecholamines, exercise, hypervolemia |
| TIMING OF DELIVERY | 37-39 weeks not after 40 weeks |
| MODE OF DELIVERY | Assisted vaginal delivery with regional anesthesia to avoid pain and increase in HR; cesarean only for obstetric indications |
| INTRAPARTUM | Monitoring for Pulmonary Edema, AVOID VALSAVA, use of telemetry can be helpful, |
| ANESTHESIA | Slow dose epidural (Avoid CSE/Spinal), Avoid rapid drop in blood pressure and sympathetic blockade |
| POSTPARTUM | Monitor urine output, lasix if needed, Pulse oximetry monitoring. Can wear an external defibrillator. Consider anticoagulation. Early follow up 3-5 days. |
| REGIONAL ANESTHESIA-EPIDURAL | Yes- avoid pain |
| REGIONAL ANESTHESIA-CSE/SPINAL | No- avoid- rapid drop in bp; avoid rapid sympathetic blockade |

## Pregnancy-Associated MI (PAMI)/SCAD

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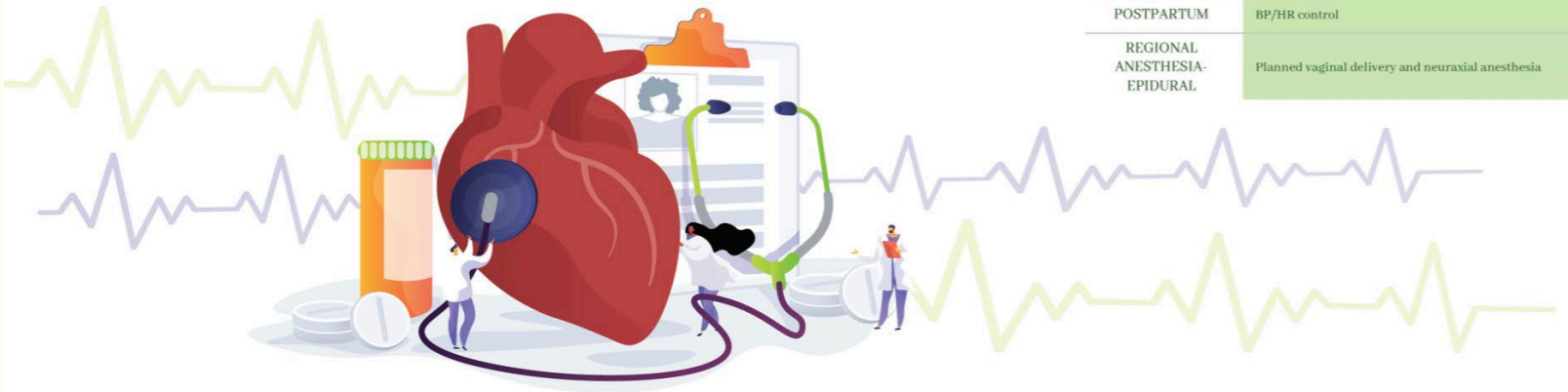
|---|---|
| PATHOPHYSIOLOGY | **PAMI:** Higher incidence of HF, malignant arrythmias and cardiogenic shock. Main mechanism is NOT atherosclerotic dz, higher incidence of LM involvment and multivessel SCAD, higher incidence of instability, Higher rate of CABG, higher rate of mortality.<br>**SCAD:** Most common cause of MI in pregnancy<br>Hormonal changes in estrogen and progesterone lead to vessel wall changes<br>Formation of intramural hematoma, separation occurring in the outer third of the tunica media and IMH occupying the dissection and compressing the true lumen, leading to coronary insufficiency and MI.<br>Risk factors, FMD, multiparity, Marfan's, Ehlers Danlos, OCPs, infertility treatment, autoimmune disease. >50% precipitating factor such as intense exercise, valsalva, retching, lifting heavy objects. |
| CLINICAL PRESENTATION | Fibromuscular dysplasia (FMD) or other arteriopathies in up to 80%; coronary artery tortuosity can be a clue<br>SCAD highest risk during first month postpartum (w/in 12 w of delivery |
| IMAGING | TTE for wall motion abnoramlities, consider LHC |
| ANTEPARTUM | **SCAD:**<br>1. Clinically stable, no high-risk anatomy>> conservative management, monitor inpatient 3-5d; 2. Clinically stable w/left main or severe proximal 2-vessel dissection>> consider CABG, conservative rx may be reasonable; 3. Active/ongoing ischemia/hemodynamic instability >> Consider PCI if feasible, or urgent CABG |
| MAINSTAY OF TREATMENT | Early invasive strategy for ACS vs. conversative medical mgmt. Most resolved within 1 month. Risk of cardiac arrest present |
| OBSTETRIC MEDICATIONS TO AVOID OR USE CAUTION | Carboprost (Hemabate), methylergonovine (Methergine) |
| BLOOD PRESSURE AND HEART RATE PARAMETERS | BP goals <120/80, B-blocker use for HR control |
| TIMING OF DELIVERY | Determined by gestational age, obstetric considerations and clinical status of mother |
| MODE OF DELIVERY | Assisted vaginal delivery with regional anesthesia to avoid pain and increase in HR; cesarean only for obstetric indications |
| POSTPARTUM | BP/HR control |
| REGIONAL ANESTHESIA-EPIDURAL | Planned vaginal delivery and neuraxial anesthesia |

## Aortic Stenosis

| | |
|---|---|
| RECOMMEND AVOIDANCE OF PREGNANCY | Severe Symptomatic |
| PATHOPHYSIOLOGY | Increase in cardiac output leads to worsening of left-sided stenotic lesions. Cardiac output increases>> left ventricular pressure increases>> symptomatic heart failure, arrythmia, syncope. As SVR decreases, DBP decreases leading to decreased coronary perfusion to thickened myocardium >> ISCHEMIA. Myocardial ischemia leads to decreased LV function and decreased cardiac output>>> more ISCHEMIA leading to DEATH! |
| CLINICAL PRESENTATION | 10% risk cardiac event with severe AS. Fixed and Limited cardiac output, through restricted valve area. Avoid hypotension and decrease preload. Red flags: previous valve intervention, ventricular dysfunction, worsening NYHA, NYHA III/IV, hx arrhythmia, hx non-vagal syncope, elevated BNP, new cardiac symptoms, worsening ventricular function, increasing pulmonary pressures, new severe valve regurgitation, more than expected increase in valve gradient, increasing BNP, coexistent dilated ascending aorta |
| IMAGING | echo to evaluate size of aortic valve opening, gradient across valve and EF (Severe= valve area <1cm2, peak gradient >75 mmHg, or EF <55% |
| ANTEPARTUM | Complete TTE with full anatomic and hemodynamic assessment of the valves. Diuresis with activity restriction for CHF<br>Cardiology comanagement<br>Anesthesia consult<br>Murmurs need follow up, Vital Signs. Surgery for severe AS with worsening NYHA class III/IV |
| MAINSTAY OF TREATMENT | Maintain afterload - Normal HR (avoid tachycardia) - Diuretics (afterload reduction) & B-blockade, exercise restriction; Prevent & monitor for ischemia - Maintain normovolemia -PP monitoring for hypotension/ischemia. Valve surgery during pregnancy is high risk, with a 30% to 40% fetal mortality rate and up to 9% maternal mortality rate reported. It should be reserved only for patients with severe, intractable symptoms unresponsive to bed rest and maximally tolerated medical therapy. |
| FLUID MANAGEMENT | Judicious Use. Maintain preload. Maintain normovolemia. AVOID hypotension. Pulse Pressure , wide PP = high preload. STV variation, does a pressure need fluids or pressor. Pulse OX waveform<br>Degree of Stenosis: strivt IVF management especially in the labor process to maintain fluid balance. |
| OBSTETRIC MEDICATIONS TO AVOID OR USE CAUTION | **Terbutaline, carboprost (Hemabate)** |
| BLOOD PRESSURE AND HEART RATE PARAMETERS | AVOID hypotension, MAP <65<br>Abnormal<br>10% of baseline systolic<br>AVOID: excessive blood loss, Valsalva, bradycardia/tachycardia, hypervolemia<br>Individualized in pts with comorbid HTN; Treat hypotension with phenylephrine; Maintain normal HR |
| MODE OF DELIVERY | labor or C/S in Main OR w/ CV surg on standby, arterial line; avoid exertion/Valsalva > assisted second stage |
| INTRAPARTUM | intra-arterial bp monitoring in labor/CD and 5-lead ECG |
| ANESTHESIA | Slow dose epidural (Avoid CSE/Spinal), Avoid rapid drop in blood pressure and sympathetic blockade |
| POSTPARTUM | close monitoring to avoid postpartum pulmonary edema (autotransfusion); also monitor for pp hypotension and ischemia |
| REGIONAL ANESTHESIA-EPIDURAL | YES- MANDATORY- carefully titrate neuraxial anesthesia onset; avoid pain |
| REGIONAL ANESTHESIA-CSE/SPINAL | NO |



Disclaimer: "This document serves only as a general guide in cases where appropriate subspecialists are not acutely available. This guide should NOT be used in place of consultation with subspecialists or transfer to tertiary care facilities. Please individualize the care of each patient."

Visit https://georgiapqc.org/cardiac-education for ordering details

# Lessons Learned: What is a LOUD Heart Murmur and Basilar Crackles?

| PHYSICAL EXAM | Yes | No |
|---|---|---|
| Basilar Crackles in Lungs Present? | | |
| Loud Heart Murmur Present? | | |

*ANY Physical Exam Finding = POSITIVE CVD RISK

## Basilar Crackles

Abnormal sounds in the base of the lungs

| | |
|---|---|
| Cause: Basilar Crackles are usually associated with the heart and lungs | • Heart Failure<br>• Pneumonia<br>• Pulmonary Edema |
| Symptoms that may also be present with Basilar Crackles | • Trouble breathing<br>• Coughing<br>• Swelling of feet and lower legs<br>• Fatigue |
| Additional Note | • More common to hear during inhalation |

## Loud Murmur

| | |
|---|---|
| Grade I: Barely Audible | faint murmur |
| Grade II: | soft murmur |
| Grade III: Easily audible | easily audible but without a palpable thrill |
| Grade IV: Easily audible | easily audible murmur with a palpable thrill |
| Grade V: Loud Murmur | audible with stethoscope lightly touching the chest |
| Grade VI: Loudest murmur | audible with stethoscope not touching the chest |

# Lessons Learned: Red Flags

Differentiating actions of an "At Risk" result based on RED FLAGS

- If the CVD Risk triggers "At Risk" with no RED FLAGS:
  - Enter "Maternal Cardiac High Risk Patient Nursing Protocol"
  - Send a secure chat to Cardiology PA-C **and** the OB provider caring for the patient
- If the CVD Risk Assessment triggers "At Risk" with RED FLAGS:
  - Notify OB provider of RED FLAG
  - Enter "Maternal Cardiac High Risk Patient Nursing Protocol
  - Notify Cardiology PA-C

| Red Flag SYMPTOMS | Yes | No |
|---|---|---|
| Does the patient feel short of breath at rest? | | |
| Does the patient sleep with 4 or more pillows/in a recliner due to SOB/difficulty breathing? | | |
| **Red Flag VITAL SIGNS** | **Yes** | **No** |
| Is the resting Heart Rate 120 more? | | |
| Is the Systolic Blood Pressure 160 or more? | | |
| Are the Respirations 30 or more? | | |
| Is the Oxygen Saturation 94% or LESS? | | |

*ANY Red Flag = POSITIVE CVD RISK

# Next Steps

- Look to Phase II of CVD Risk Assessment
  - Phase II-OB and Primary Care offices
  - Phase III- Urgent Care
  - Phase IV- Emergency Department
- Implementation of Remote Patient Monitoring
- Operationalize the use of Telehealth