DIAGNOSTIC EXCELLENCE:
Cardiovascular Risk Assessment in Pregnancy

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ACKNOWLEDGMENTS

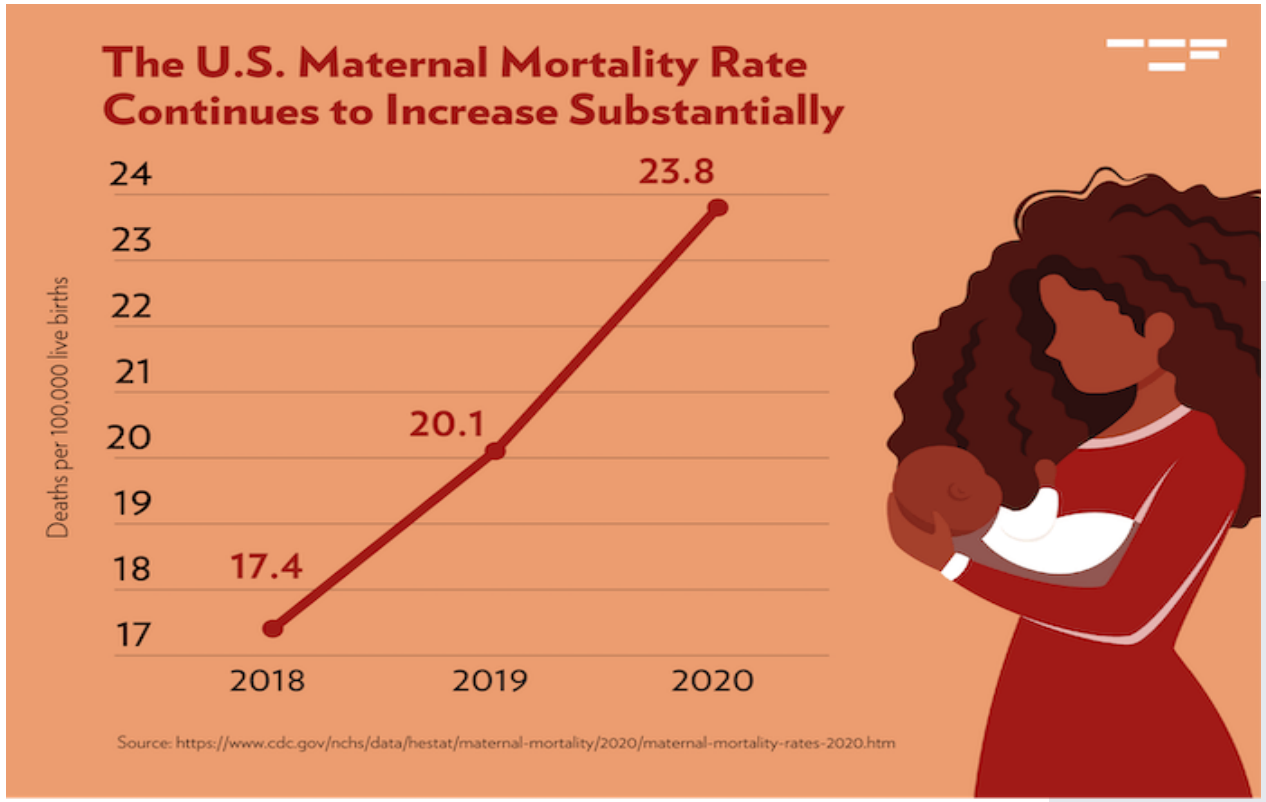
Gordon and Betty Moore Foundation (Award # 9055) Improving Diagnostic Excellence

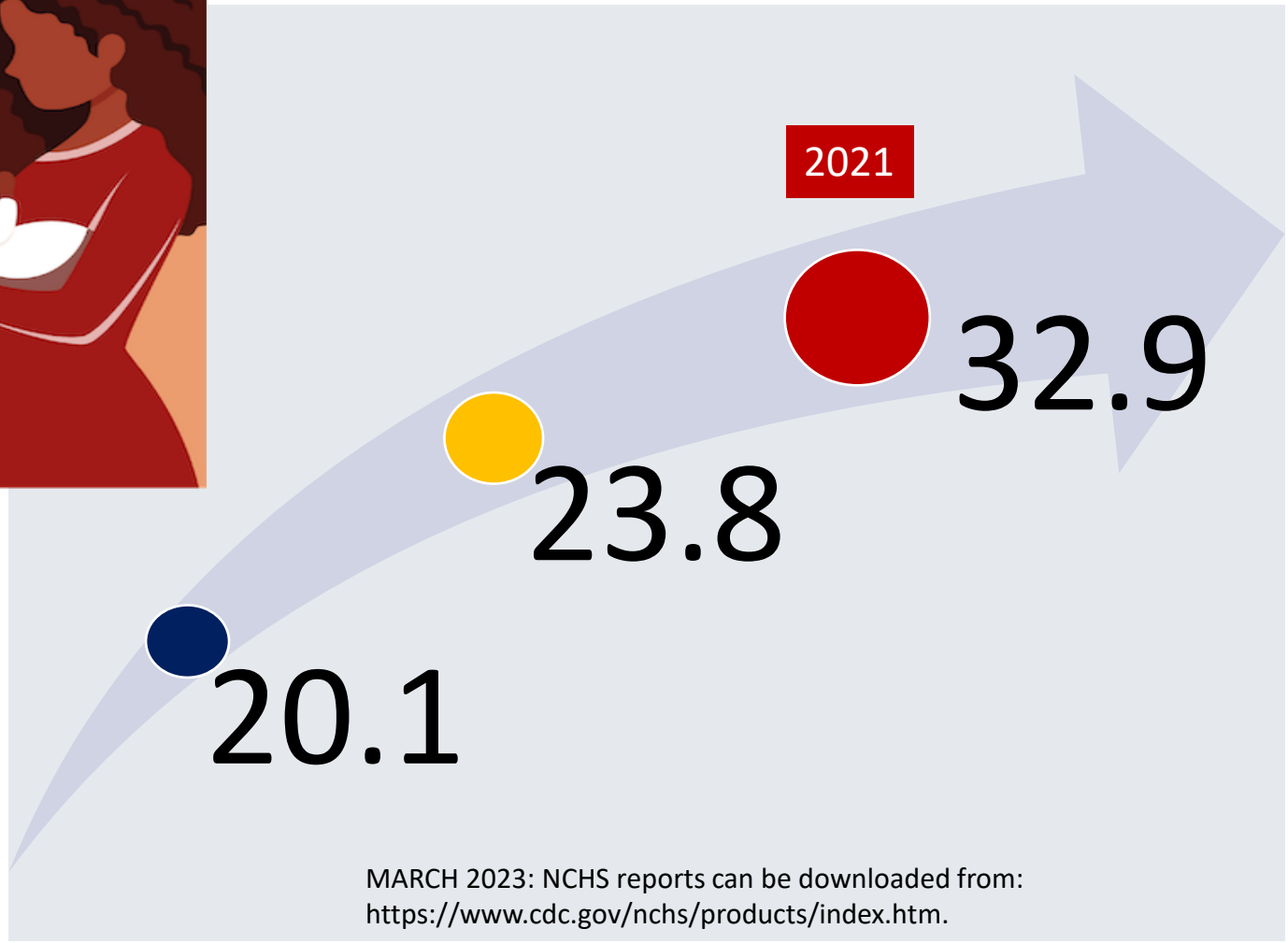
GORDON AND BETTY MOORE FOUNDATION

Eunice Kennedy Shriver National Institute of Child Health and Human Development (Award # 5R21HD101783-02)

NIH Eunice Kennedy Shriver National Institute of Child Health and Human Development

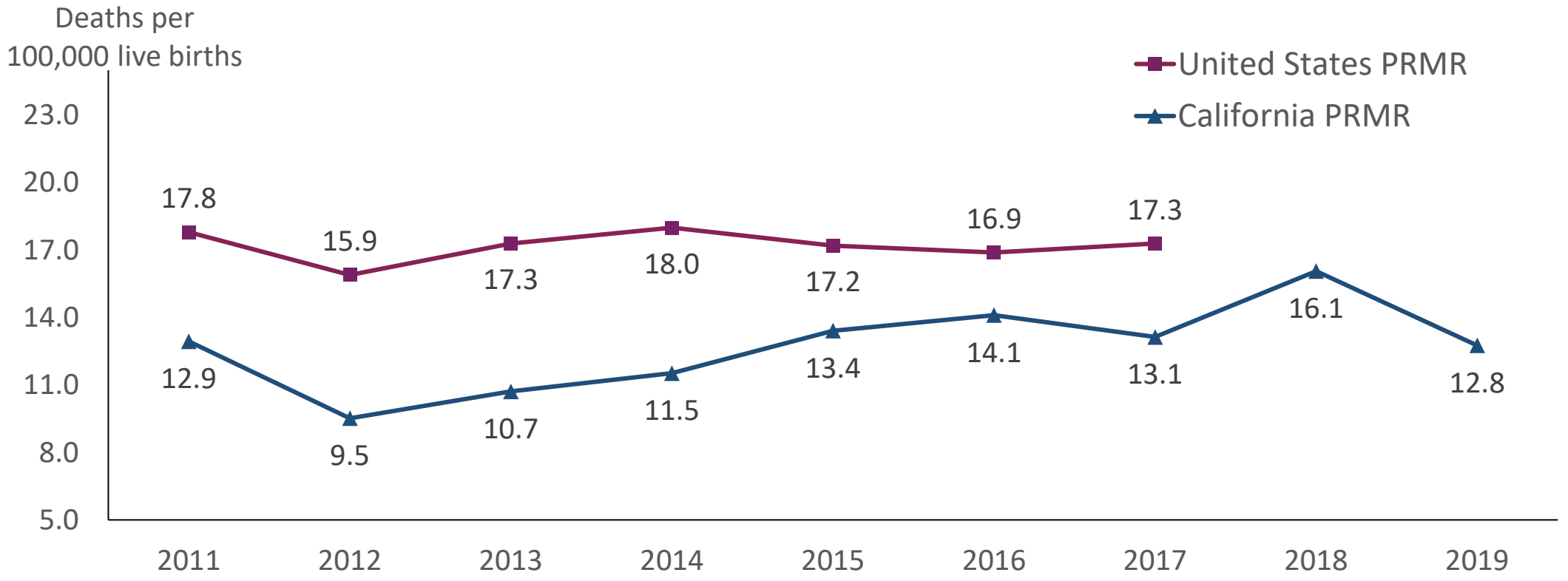
Healthy pregnancies. Healthy children. Healthy and optimal lives.





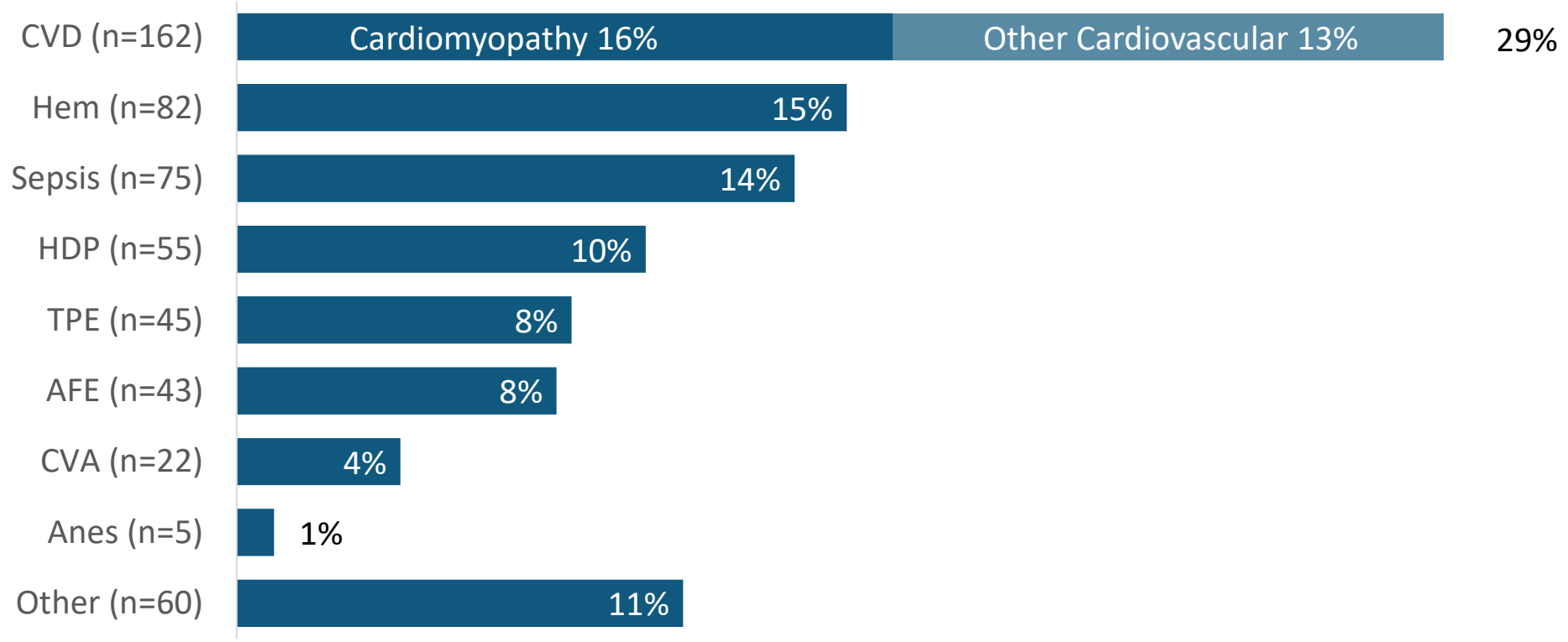
MARCH 2023: NCHS reports can be downloaded from: https://www.cdc.gov/nchs/products/index.htm.

Pregnancy-Related Mortality Ratio in U.S. and California 2011-2019



Pregnancy-related mortality ratio (PRMR) = Number of pregnancy-related deaths per 100,000 live births, up to one year after the end of pregnancy. Pregnancy-relatedness determinations were made through a structured expert committee case review process. Data on U.S. PRMR are published by CDC Pregnancy Mortality Surveillance System (accessed at Pregnancy Mortality Surveillance System | Maternal and Infant Health | CDC on January 19, 2022).

Pregnancy-Related Deaths by Cause California 2011-2019



Pregnancy-related deaths include deaths within a year of pregnancy from causes related to or aggravated by the pregnancy or its management, as determined by expert committee review. Abbreviations: CVD = Cardiovascular disease; Sepsis = Sepsis or infection; Hem = Hemorrhage; HDP = Hypertensive disorders of pregnancy; AFE = Amniotic fluid embolism; TPE = Thrombotic pulmonary embolism; CVA = Cerebrovascular accident; Anes = Anesthesia complications; Other = Other medical condition(s). *Note: Deaths with undetermined cause were excluded from analysis (n=2).*

CA-PAMR Findings 2002-2006

Timing of Diagnosis and Death

Timing of CVD Diagnosis (n=64)

- Preexisting (prior to pregnancy)
- Prenatal period
- At labor and delivery
- Postpartum period
- Postmortem

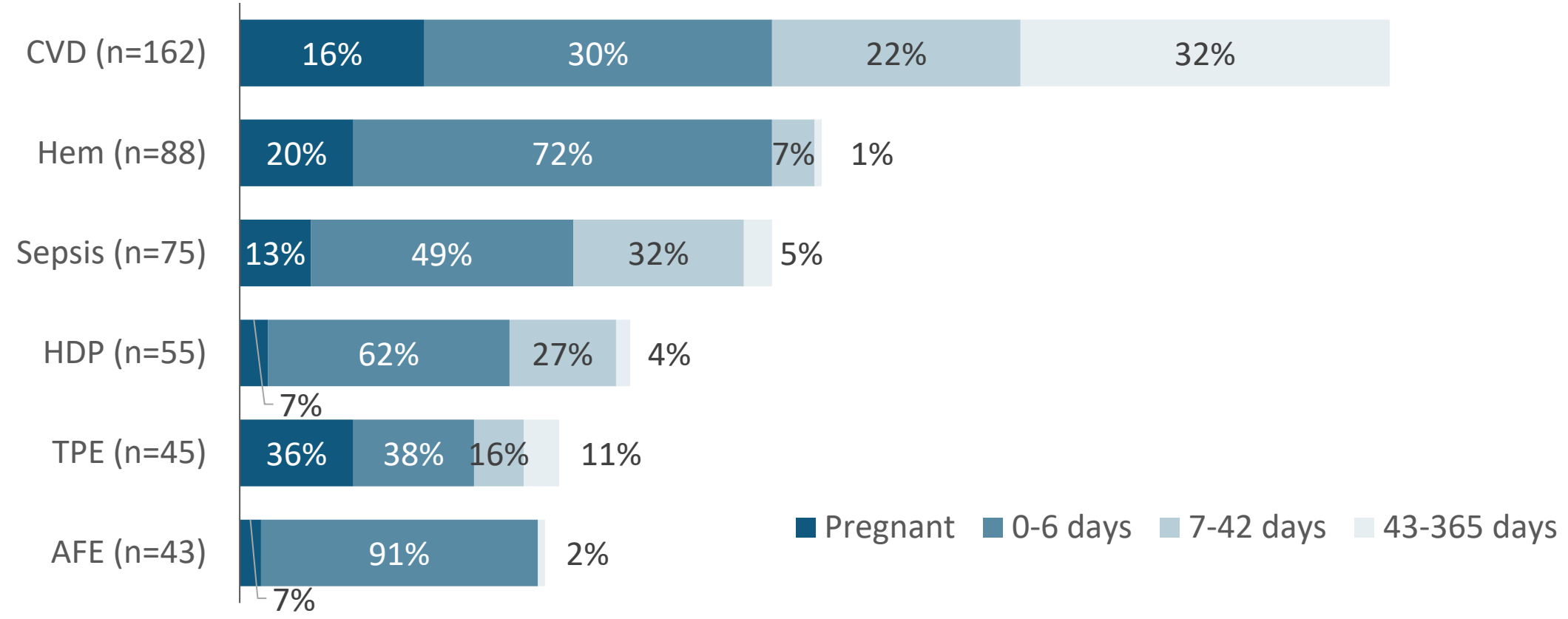
Timing of Death

30% of all CVD deaths were >42 days from birth/fetal demise vs. 7.3% of non-CVD pregnancy-related deaths

Driven by Cardiomyopathy deaths, with 42.9% deaths >42 days

Reference: Hameed A, Lawton E, McCain CL, et al. Pregnancy-Related Cardiovascular Deaths in California: Beyond Peripartum Cardiomyopathy. *American Journal of Obstetrics and Gynecology* 2015; DOI: 10.1016/j.ajog.2015.05.008

Pregnancy-Related Deaths by Cause and Timing to Death California 2011-2019



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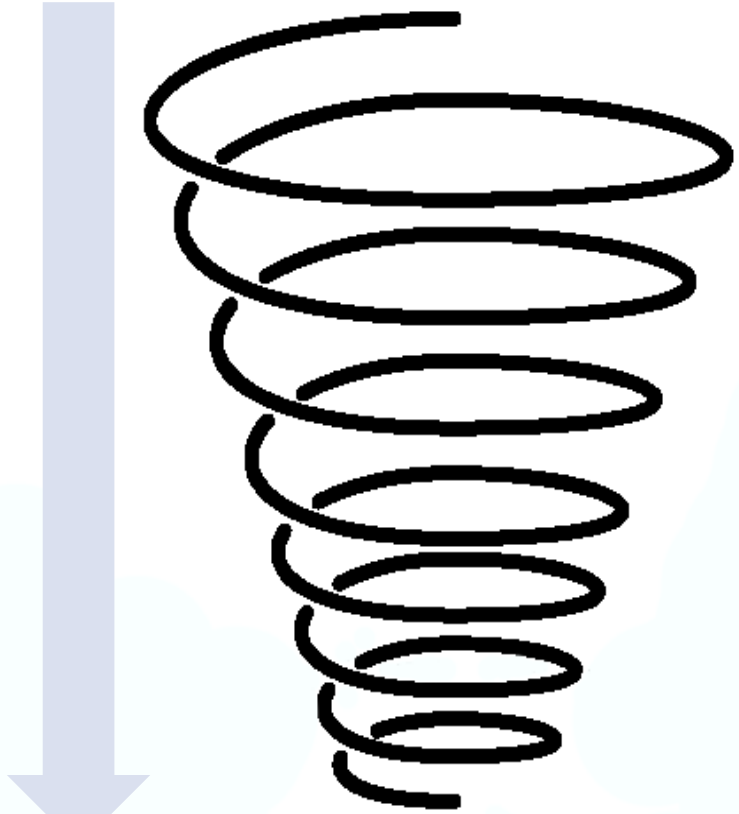


DEATH

- Heart failure
- Arrhythmia

How did the patients who died present?

Only 2 women entered pregnancy with known CVD

SYMPTOMS

- Shortness of breath
- Wheezing
- Palpitations
- Edema
- Chest pain
- Dizziness
- Extreme fatigue

CMQCC Cardiovascular Disease Toolkit

The CVD Toolkit was developed by CMQCC at Stanford University under contract with CDPH with funding from a federal Title V MCH Block grant.

CMQCC
California Maternal
Quality Care Collaborative

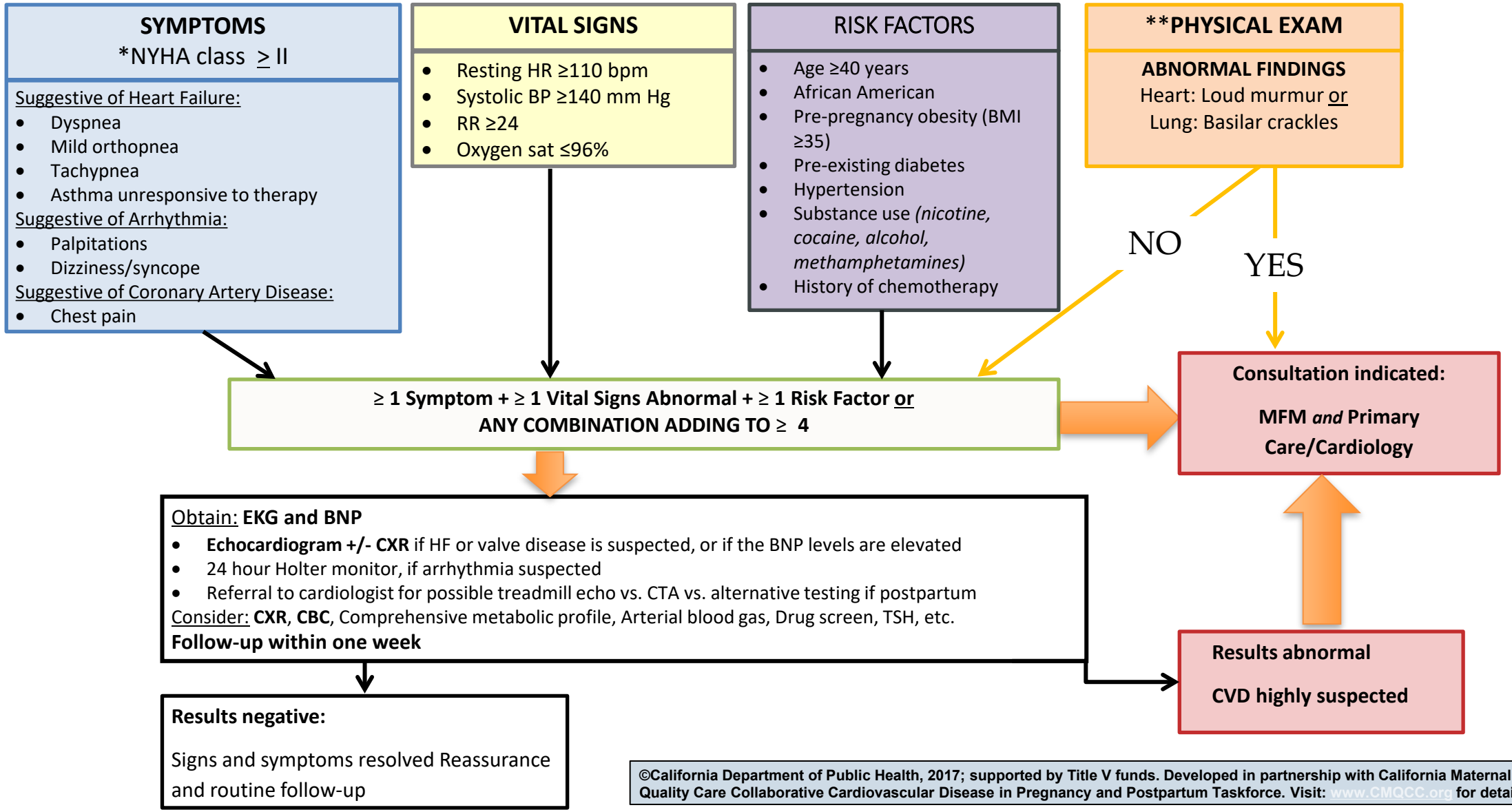
Algorithm validated
64 CVD deaths.

Detection rate 93% in symptomatic cases Identified as **screen-positive** or high risk for CVD.

Reference: Hameed, AB, Morton, CH and A Moore. Improving Health Care Response to Cardiovascular Disease in Pregnancy and Postpartum Developed under contract #11-10006 with the California Department of Public Health, Maternal, Child and Adolescent Health Division. Published by the California Department of Public Health, 2017.

UCI University of California, Irvine

ALGORITHM 2. (No Red Flags and/or no personal history of CVD, and hemodynamically stable)



Milestones

2017

CVD TOOLKIT PUBLISHED

CMQCC at Stanford University in partnership with CDPH through federal Title V MCH block funding

2019

GRANT

- Received Gordan and Betty Moore Foundation Diagnostic Excellence Initiative
- Applied for Eunice Kennedy Shriver National Institute of Child Health and Human Development R21

2020

TECHNICAL EXPERT PANEL

Convened a multidisciplinary advisory group to guide the development and refinement of the measures and implementation in the Electronic Health Record (EHR)

2021

IMPLEMENTATION

Partnered with five hospital networks:

- University of California, Irvine (UCI)
- University of California, San Diego (UCSD)
- University of Tennessee (UTENN)
- St. Luke's Hospital System
- Montefiore Medical Center (MMC)

2022

SUBMISSION TO CMS & NQF

- Measure submitted to Centers for Medicaid and Medicare Services (CMS) and the National Quality Forum (NQF).

2023

OUTCOMES DATA ANALYSIS AND REPORTING

DISSEMINATION

JACC: Advances
AIM CCOC Bundle

UCI University of California, Irvine

DEVELOPING CARDIOVASCULAR SCREENING MEASURES FOR PREGNANT & POSTPARTUM PATIENTS

1. CVD Risk Assessment = $\frac{\text{Pregnant + Postpartum patients screened for CVD using algorithm}}{\text{All pregnant + postpartum patients seen at facility without prior history of known cardiac disease}}$

2. CVD Risk Follow-up = $\frac{\text{Patients who received follow up for CVD Risk}}{\text{Patients who had a positive CVD risk assessment}}$

APPROACH

Integrate CVD algorithm into the EMR

Clinicians receive immediate score SCREEN POSITIVE

- Follow-up imaging
- Follow-up laboratory test
- Follow-up consultations

Follow-up monitored through EMR

Upload data to UCI REDCap

- Elicit feedback
- Review measures with TEP

UCI University of California, Irvine

California Cardiovascular Screening Tool: Findings from Initial Implementation

Elizabeth A. Blumenthal, MD, MBA[1] B. Adam Crosland, MD[1] Dana Senderoff, MD[1] Kathryn Santurino, MD[2] Nisha Garg, MD[1] Megan Bernstein, MD[1] Diana Wolfe, MD[2] Afshan Hameed, MD[1]

[1] Department Obstetrics and Gynecology, University of California, Irvine, Orange, California
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Am J Perinatol Rep 2020;10:e362–e368.

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N=846 women screened

Screen Positive 8% (5% California, 19% New York)

NO SHOW to MFM Cardiology (70% in New York, 27% in California)

CVD Diagnosis Confirmed in 30% of Referred Cases

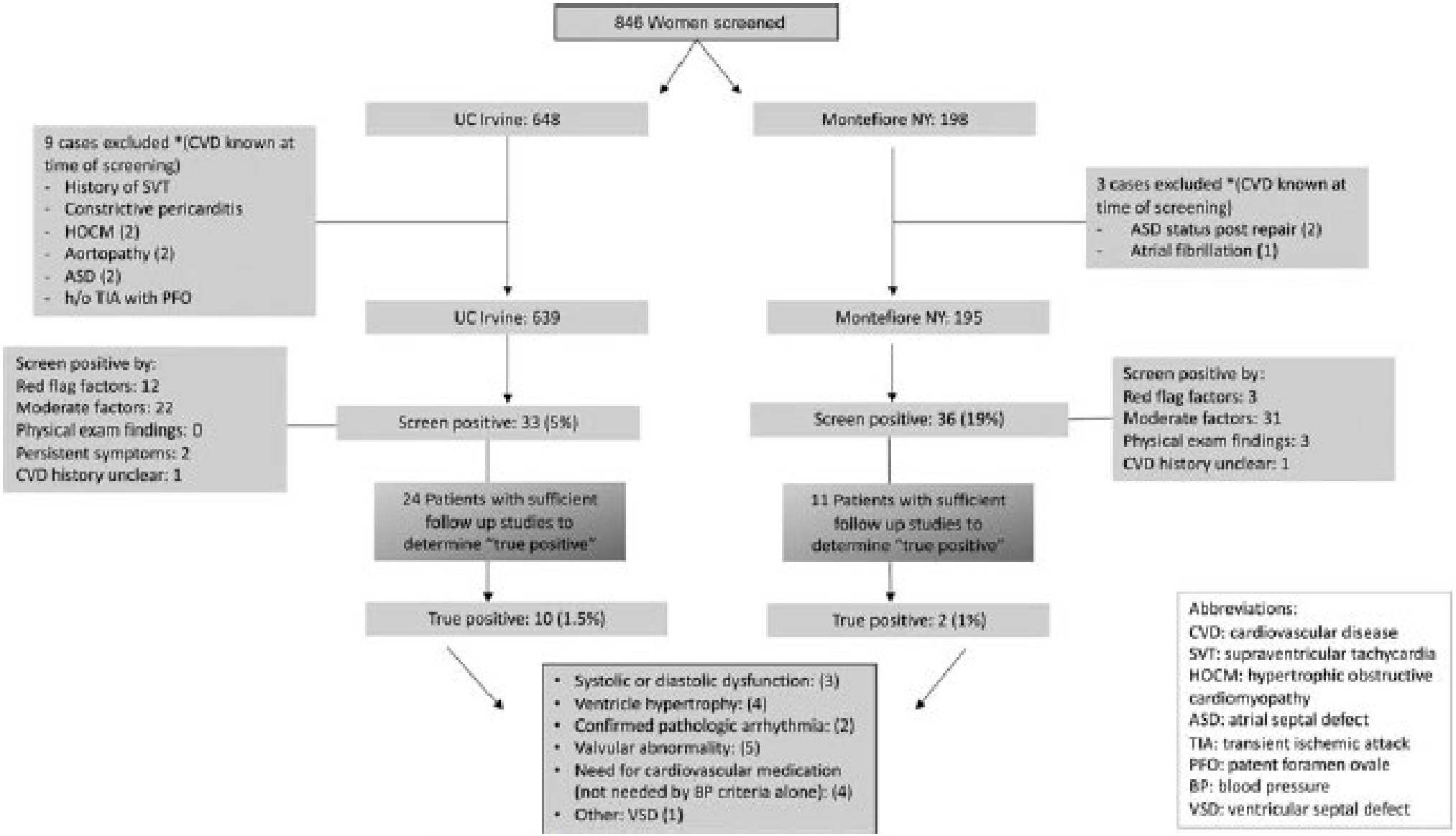


Fig. 2 Case selection. ASD, atrial septal defect; BP, blood pressure; CVD, cardiovascular disease; HOCM, hypertrophic obstructive cardiomyopathy; NY, New York; PFO, patent foramen ovale; SVT, supraventricular tachycardia; TIA, transient ischemic attack; UC, University of California; VSD, ventricular septal defect.

OPEN

Consensus Statement

Alliance for Innovation on Maternal Health

Consensus Bundle on Cardiac Conditions in Obstetric Care

Afshan B. Hameed, MD, Alison Haddock, MD, Diana S. Wolfe, MD, MPH, Karen Florio, DO, MPH, Nora Drummond, DNP, CNM, Christie Allen, MSN, BSN, Isabel Taylor, MS, Susan Kendig, JD, MSN, Garssandra Presumey-Leblanc, MS, and Emily Greenwood, MPH

(Obstet Gynecol 2023;141:253–63)

READINESS (EVERY CLINICAL SETTING)

1. Train All Obstetric Care Professionals to Perform a Screen for Cardiac Conditions

Evidence suggests that implementation of a screen for cardiac conditions for pregnant and postpartum people in all clinical care settings is a is a key step toward reducing the burden of maternal mortality due to cardiac conditions.[8] A cardiovascular risk-assessment algorithm developed by the CMQCC (California Maternal Care Quality Collaborative) (see https://www.cmqcc.org/resources-toolkits/toolkits/improving-health-care-response-cardiovascular-disease-pregnancy-and) stratifies pregnant and postpartum patients into low risk and high risk for cardiovascular disease.[9] The algorithm can be applied to all pregnant and postpartum people at their first clinical encounter regardless of gestational age.[10] In a retro-

RECOGNITION AND PREVENTION (EVERY HEALTH CARE PROFESSIONAL AND CLINICAL SETTING)

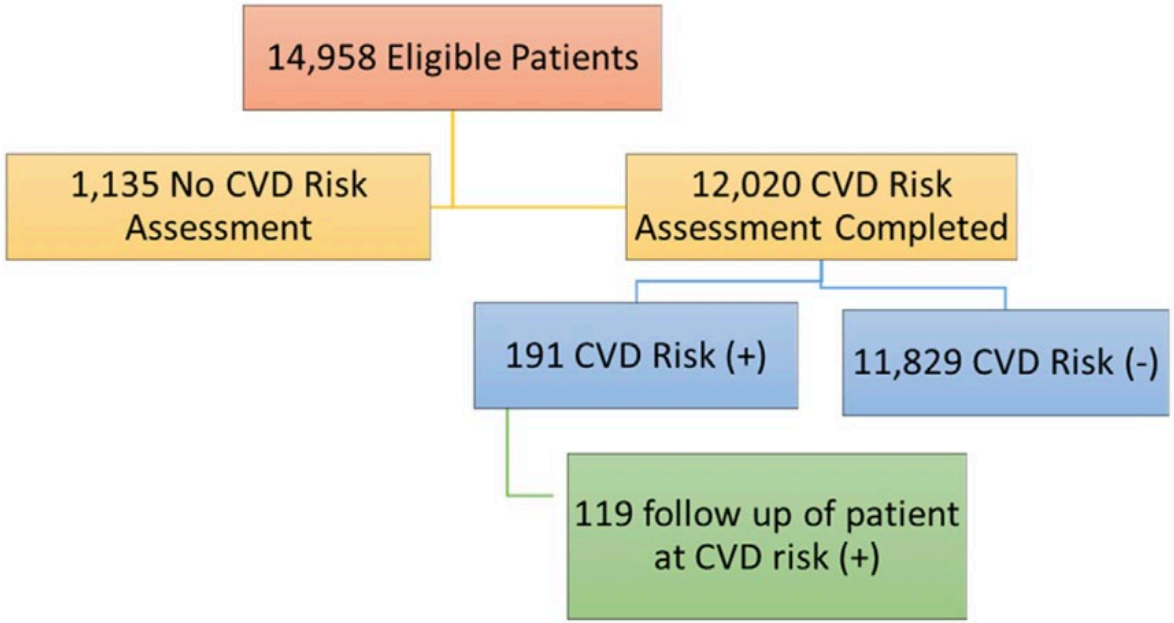
11. Use Standardized Cardiac Risk-Assessment Tools to Identify and Stratify Risk

Staff training and integration of cardiac risk-assessment tools and documentation into the electronic medical record may support regular utilization of the standardized assessment tools. More detail on standardized cardiac risk assessments can be found in Readiness Element 1.

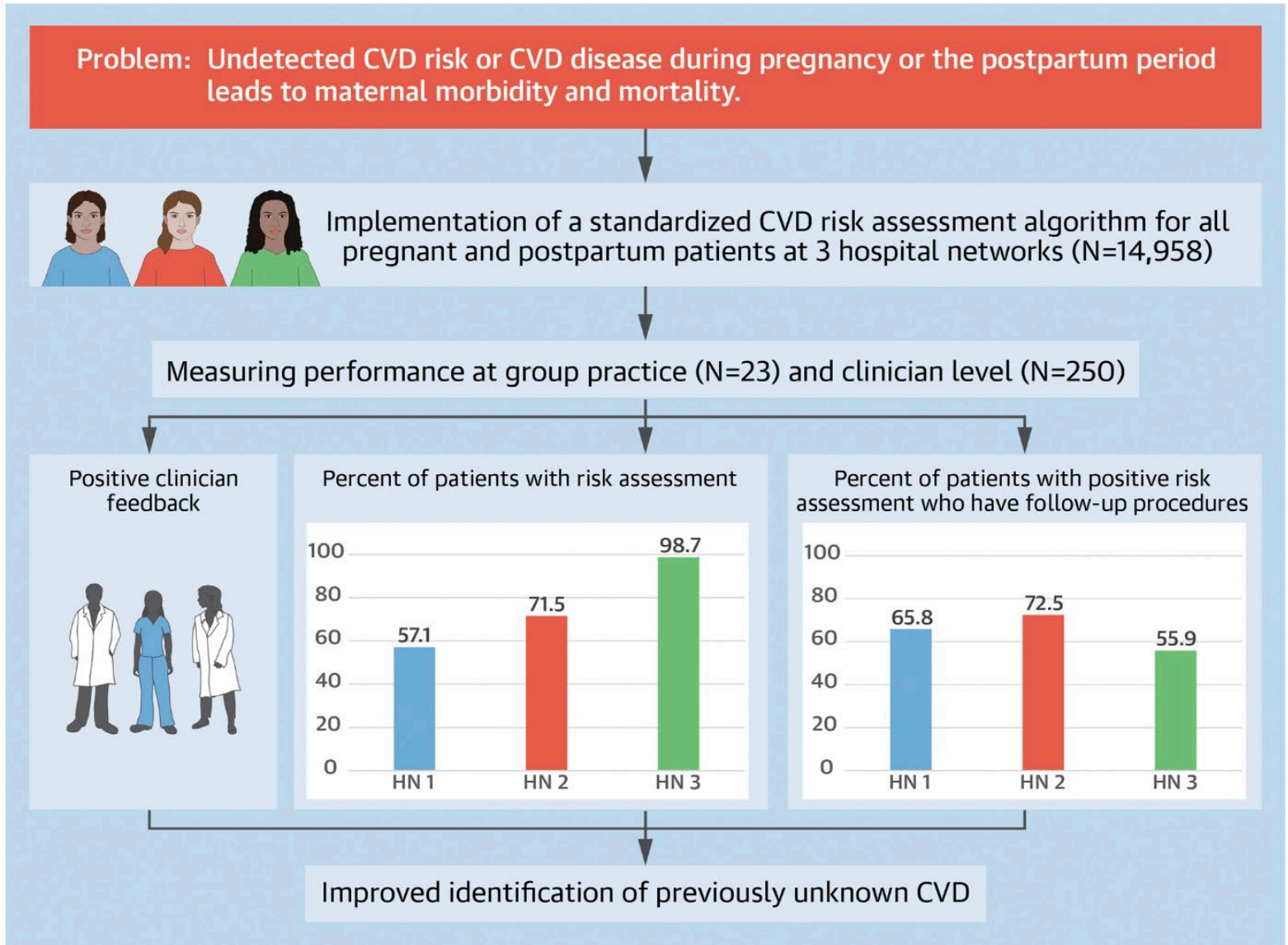
Cardiovascular Risk Assessment as a Quality Measure in the Pregnancy and Postpartum Period

Afshan B. Hameed, MD,[a,b] Maryam Tarsa, MD, MAS,[c] Cornelia R. Graves, MD,[d] Jenny Chang, MPH,[e] Manija Billah, BA,[f] Tamera Hatfield, MD, PhD,[g] Heike Thiel de Bocanegra, PhD, MPH[h]

FIGURE 3 CVD Risk Assessment in Patient Population

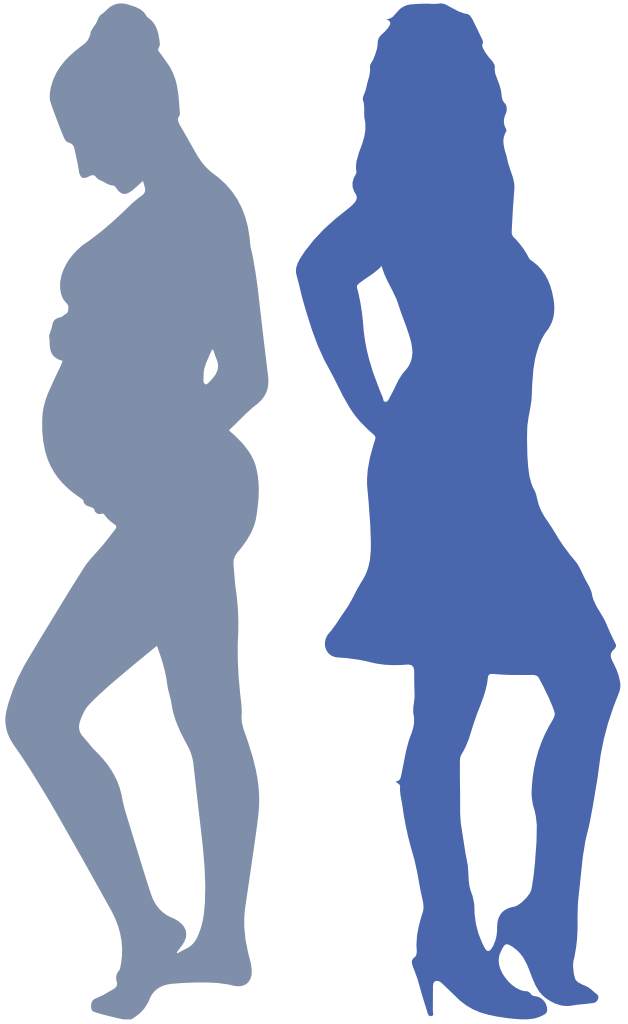


CENTRAL ILLUSTRATION Early Recognition of CVD Using Risk Assessment Measures



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

BENEFITS OF CVD SCREENING in PREGNANCY



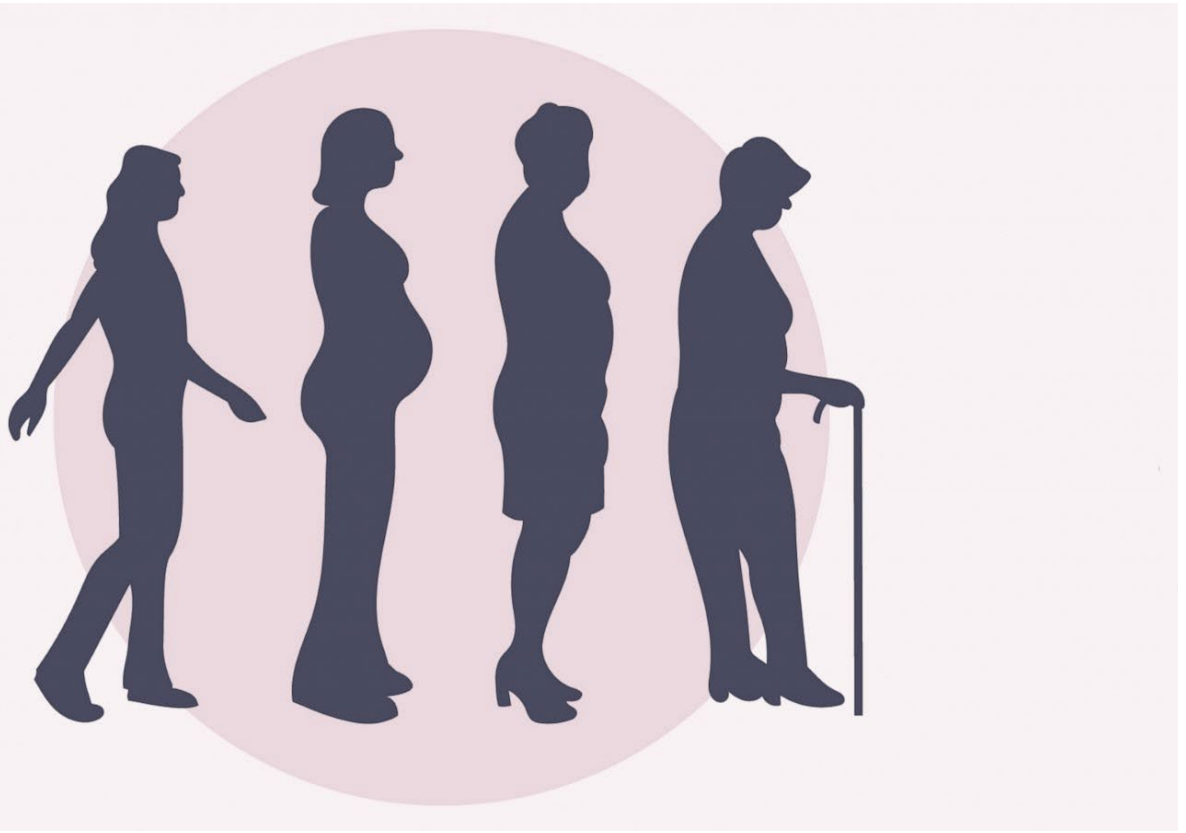
Transition to Primary Care
Inter-conception care

Postpartum Risk Evaluation

Pregnancy

CVD risk during Pregnancy

CVD risk after Pregnancy



For more information about the CVD Risk Assessment, please feel free to reach out to our team at the University of California, Irvine

Website

https://sites.uci.edu/cvdriskassessmentmeasures/

Read

Hameed, A.B., Tarsa, M., Graves, C.R., Chang, J., Billah, M., Hatfield, T., & Thiel de Bocanegra, H. (2023). Cardiovascular Risk Assessment as a Quality Measure in the Pregnancy and Postpartum Period. *JACC: Advances*, 2 (1). https://doi.org/10.1016/j.jacadv.2022.100176.

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