

Alliance for Innovation on Maternal Health

Consensus Bundle on Cardiac Conditions in Obstetric Care

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Cardiac conditions are the leading cause of pregnancy-related deaths and disproportionately affect non-Hispanic Black people. Multidisciplinary maternal mortality review committees have found that most people who died from cardiac conditions during pregnancy or postpartum were not diagnosed with a cardiovascular disease before death and that more than 80% of all pregnancy-related deaths, regardless of cause, were preventable. In addition, other obstetric complications, such as preeclampsia and gestational diabetes, are associated with future cardiovascular disease risk. Those with cardiac risk factors and those with congenital and acquired heart disease require specialized care during pregnancy and postpartum to minimize risk of preventable morbidity and mortality. This bundle provides guidance for health care teams to develop coordinated, multidisciplinary care for pregnant and postpartum people with cardiac conditions and to respond to cardio-obstetric emergencies. This bundle is one of

several core patient safety bundles developed by the Alliance for Innovation on Maternal Health that provide condition- or event-specific clinical practices for implementation in appropriate care settings. The Cardiac Conditions in Obstetric Care bundle is organized into five domains: 1) *Readiness*, 2) *Recognition and Prevention*, 3) *Response*, 4) *Reporting and Systems Learning*, and 5) *Respectful Care*. This bundle is the first by the Alliance to be developed with the fifth domain of *Respectful Care*. The *Respectful Care* domain provides essential best practices to support respectful, equitable, and supportive care to all patients. Further health equity considerations are integrated into elements in each domain.

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Maternal mortality is rising in the United States, with approximately 17 per 100,000 people dying of pregnancy-related causes every year.¹ Car-

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diac conditions account for approximately one third of all pregnancy-related deaths, with a disproportionate number of deaths among non-Hispanic Black people.²

Although many other causes of maternal mortality have decreased, deaths from cardiac conditions continue to rise.³ In-depth mortality reviews have found that more than 80% of all pregnancy-related deaths are preventable, including those caused by cardiac conditions in pregnancy.⁴

Pregnancy acts as a physiologic cardiovascular stress test by virtue of the hemodynamic changes that occur.^{5,6} Moreover, pregnancy may aggravate underlying cardiac disease or may result in de novo cardiomyopathy or peripartum cardiomyopathy. Prior reviews by state maternal mortality review committees have found that a majority of pregnant and postpartum people who died of cardiac conditions did not have a cardiac condition diagnosis before death; however, most had underlying risk factors and had presented with signs and symptoms suggestive of cardiac disease.⁷ Thus, it is important for health care professionals to recognize maternal signs and symptoms as potentially cardiac in nature.

The Alliance for Innovation on Maternal Health convened an interdisciplinary workgroup to develop a Cardiac Conditions in Obstetric Care (see <https://saferbirth.org/psbs/cardiac-conditions-in-obstetrical-care/>) patient safety bundle (Box 1). Patient safety bundles are clinical condition-specific collections of evidence-based practices intended to be uniformly applied to the care of every patient, in all appropriate care settings, in every episode of relevant care. For the Cardiac Conditions in Obstetric Care patient safety bundle, *cardiac conditions* refer to disorders of the cardiovascular system that may affect maternal health. Such disorders may include congenital heart disease and acquired heart disease in pregnancy and 12 months postpartum, including but not limited to cardiac valve disorders, cardiomyopathies, arrhythmias, coronary artery disease, pulmonary hypertension, and aortic dissection.

The Cardiac Conditions in Obstetric Care patient safety bundle does not introduce new guidance or evidence but summarizes existing recommendations to effectively implement best practices in all maternity care settings. The Cardiac Conditions in Obstetric Care patient safety bundle is organized into five domains: *Readiness, Recognition and Prevention, Response, Reporting and Systems Learning, and Respectful Care*. This patient safety bundle is part of a subset of core patient safety bundles in the Alliance for Innovation on Maternal Health initiative that cross the continuum

of care, beyond the labor and delivery setting to the emergency department (ED), primary care, and other outpatient settings.

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 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 retrospective fashion, investigators applied this algorithm to 64 maternal deaths from cardiovascular disease and found that 93% of the decedents would have screened positive or at increased risk for cardiovascular disease before their deaths.⁷ When applied prospectively to a general obstetric population (n=846), a total of 8% of participants screened positive using the algorithm and were referred for further evaluation by maternal-fetal medicine subspecialists or cardiologists or both. Among 35 patients who attended their consultations, 12 were diagnosed with cardiac conditions.¹¹ We recommend that all obstetric care professionals implement standardized risk assessment for cardiac disease in pregnancy and refer high-risk patients for additional evaluation.

2. Establish a Protocol for Rapid Identification of Potential Pregnancy-Related Cardiac Conditions in All Practice Settings in Which Pregnant and Postpartum People May Present for Care

Early identification of cardiac deterioration in pregnant and postpartum patients and rapid intervention is essential to safe, effective care. Pregnant or postpartum people presenting with cardiac symptoms, such as shortness of breath, palpitations, or chest pain, should be evaluated for peripartum cardiomyopathy and significant cardiac conditions. Such symptomatology warrants cardiac testing, such as an electrocardiogram, B-type natriuretic peptide test, or echocardiogram, or a combination of these, along with a cardiology consultation. The cardiovascular

Fig. 1. How to differentiate common signs and symptoms of normal pregnancy versus those that are abnormal and indicative of underlying cardiac disease. Reprinted from Pregnancy and heart disease. ACOG Practice Bulletin No. 212. American College of Obstetricians and Gynecologists. *Obstet Gynecol* 2019;133:e320–56. doi: 10.1097/AOG.0000000000003243. Table 2 in the Practice Bulletin is noted as modified from Thorne S. Pregnancy and native heart valve disease. *Heart* 2016;102:1410–7. doi: 10.1136/heartjnl-2014-3067. BP, blood pressure; CVD, cardiovascular disease; CXR, chest x-ray; HR, heart rate; JVP, jugular venous pressure; OSA, obstructive sleep apnea; RR, respiratory rate. *If unclear, any combination of factors in the yellow column that add up to 4 or more should prompt further evaluation. †Data in this column from Afshan B. Hameed, Christine H. Morton, and Allana 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. Available at <https://www.cmqcc.org/resources-toolkits/toolkits/improving-health-care-response-cardiovascular-disease-pregnancy-and->. ‡History of CVD or signs and symptoms in the red column should lead to urgent evaluation by the Pregnancy Heart Team. §Should raise concern about heart failure and should promptly be evaluated.

	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§	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

Hameed. *Consensus on Cardiac Conditions in Obstetric Care. Obstet Gynecol* 2023.

disease screening toolkit and triage table outlined in ACOG Practice Bulletin No. 212 may be used or adapted in different care settings^{10,12} (Fig. 1).

Integration of early warning signs that trigger alerts for cardiac risk into the electronic medical record, when possible, can also be used to identify those at increased risk. Triage of cardiac warning signs in pregnant and postpartum patients is outlined in Figure 1.¹⁰

3. Develop a Patient Education Plan Based on Pregnant and Postpartum People's Risk of Cardiac Conditions

Given the significant risk posed by cardiac conditions during pregnancy and the postpartum period, culturally and linguistically appropriate patient education on warning signs indicating the need to seek immediate care is essential. Resources such as those available through the Centers for Disease Control and

Prevention's HEAR HER campaign (see <https://www.cdc.gov/hearher/index.html>) detail urgent warning signs and the need for care.¹³ Discharge instructions also should include information related to timing of and support in scheduling recommended postpartum appointments.

More intensive, tailored education may be warranted for patients with identified cardiac risk factors or those who have experienced a cardiac event. This may include education on known risk factors for cardiovascular disease and symptoms that indicate the need for emergent care, as well as discussion of the importance of regular evaluation and monitoring of cardiovascular health during the year postpartum. Patients who experience complications, such as preeclampsia and other hypertensive disorders, gestational diabetes, preterm birth, small-for-gestational-age newborns, and stillbirth, may be at increased risk of future cardiac disease.^{14,15}

Table 1. The Pregnancy Heart Team*

	Modified WHO Pregnancy Risk Classification I	Modified WHO Pregnancy Risk Classification II	Modified WHO Pregnancy Risk Classifications III and IV
Pregnancy Heart Team Members	Obstetrician, family medicine practitioner, internist Cardiologist consultation	Obstetrician, family medicine practitioner, internist Maternal-fetal medicine subspecialist Cardiologist consultation	Obstetrician, family medicine practitioner, maternal–fetal medicine subspecialist, internist, obstetric anesthesiologist, cardiology subspecialists in adult congenital/aortopathy*, heart rhythm*, heart failure*, pulmonary hypertension*, and cardiac imaging* Interventional cardiologist* Cardiac surgeon* Neonatologist* Geneticist* Mental health specialist* Pharmacist*

Abbreviation: WHO, World Health Organization.

* Ad Hoc members of a Pregnancy Heart Team.

Reprinted from Pregnancy and heart disease. ACOG Practice Bulletin No. 212. American College of Obstetricians and Gynecologists. *Obstet Gynecol* 2019;133:e320–56. doi: 10.1097/AOG.0000000000003243

4. Establish a Multidisciplinary Pregnancy Heart Team, or Consultants Appropriate to the Facility’s Designated Level of Maternal Care to Care for People Experiencing Cardiac Conditions in Pregnancy and Postpartum

Every facility where a pregnant or postpartum person may present should have a plan for convening a Pregnancy Heart Team or a plan to access one when needed through telehealth or remote consultation. The team can be comprised of onsite obstetric care professionals and subspecialists or wholly or in part as a virtual team in hospitals where subspecialists are not readily available onsite. Table 1 provides examples of suggested team members and roles.

Pregnancy Heart Team members and consultants should be appropriate to the designated regionalized risk-appropriate care level or level of maternal care. For example, level 1 obstetric centers where there are no maternal–fetal medicine specialists or cardiologists present may include alternate short-term access to resources in the ED or intensive care unit, with access to tertiary care and quaternary perinatal programs through telehealth. Facilities with no obstetric care services may rely on the ED team as the first line in assessing and managing pregnant and postpartum patients presenting for care, with established programs for transport and remote consultation. In this instance, the health care professionals in the ED would assess the patient for emergent risk, stabilize the patient, and contact the nearest obstetric service for support, consultation, and virtual connection to a Pregnancy Heart Team. The ED staff and the Preg-

nancy Heart Team then could work collaboratively to determine stability for and timing of transport to the appropriate level of maternal care. If delivery is imminent, the Pregnancy Heart Team may provide consultation and support remotely as the patient is prepared for postdelivery transport.

5. Establish a Coordinated Approach to Appropriate Consultation, Co-Management, and Transfer to Appropriate Level of Maternal or Newborn Care When Indicated

A coordinated approach to co-management or consultation or both to ensure that each patient has access to the appropriate level of care at the appropriate time, including transfers to appropriate levels of maternal and newborn care, must occur. These clinical pathways, such as how to access subspecialists and maternal transport, should be established in advance to allow for timely support when a pregnant person in cardiac distress presents to a nondelivering facility or lower level of care. Indications for transfer to a higher level of care may include need for cardiac catheterization, subspecialty care, telemetry in the labor and delivery unit, in-house anesthesiologists, and access to a heart failure treatment team.

Processes for transfer should be established in advance and include modes of transport with continuous availability. A mutually agreed on briefing form may assure that critical information is readily available to all necessary health care professionals and staff involved in transfers and care of pregnant and postpartum cardiac patients.¹⁶

Box 1. Summary of Cardiac Conditions in Obstetric Care Patient Safety Bundle

Readiness—every unit

1. Train all obstetric care professionals to perform a screen for cardiac conditions
2. Establish a protocol for rapid identification of potential pregnancy-related cardiac conditions in all practice settings in which pregnant and postpartum people may present for care
3. Develop a patient education plan based on the pregnant or postpartum person's risk of cardiac conditions
4. Establish a multidisciplinary *Pregnancy Heart Team*, or consultants appropriate to the facility's designated maternal level of care for people experiencing cardiac conditions in pregnancy and postpartum
5. Establish a coordinated approach to appropriate care consultation, co-management, and transfer to appropriate level of maternal or newborn care when indicated
6. Develop trauma-informed protocols and training to address health care team member biases to enhance quality of care
7. Develop and maintain a set of referral resources and communication pathways between obstetric care professionals, community-based organizations, and state and public health agencies to enhance quality of care

Recognition and Prevention—every patient

8. and 9. Obtain a focused pregnancy and cardiac history in all health care settings, including the emergency department, urgent care, and primary care, for reproductive-aged patients regardless of cardiac symptoms
10. Assess whether escalating warning signs for an imminent cardiac event are present
11. Use standardized cardiac risk-assessment tools to identify and stratify risk
12. Conduct a risk-appropriate workup for cardiac conditions to establish a diagnosis and implement the initial management plan
13. Screen each person for comorbid conditions and risk factors for cardiac conditions and provide linkage to community services and resources for comprehensive care

Response—every event

14. Implement facility-wide standard protocols with checklists and escalation policies for management of cardiac symptoms
15. Implement facility-wide standard protocols with checklists and escalation policies for management of people with known or suspected cardiac conditions
16. Coordinate transitions of care, including discharge from the birthing facility to home and transition from postpartum care to ongoing primary and specialty care
17. Offer reproductive life planning discussions and resources, including access to a full range of safe and effective contraceptive options

18. Provide patient education focused on general life-threatening postpartum complications and early warning signs, including instructions of whom to notify if they have concerns and the importance of a scheduled postpartum visit

Reporting and Systems Learning—every unit

19. For pregnant and postpartum people at high risk for a cardiac event, establish a culture of multidisciplinary planning, admission huddles, and postevent debriefs
20. Perform multidisciplinary review of serious complications to identify systems issues
21. 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

Respectful Care—every unit, health care professional, and team member

22. Screen for structural and social determinants of health that might influence clinical recommendations or treatment plans and provide linkage to resources that align with the pregnant or postpartum person's literacy, cultural needs, and language proficiency
23. Engage in open, transparent, and empathetic communication with pregnant and postpartum people and their identified support teams to promote understanding of diagnoses, options, and treatment plans
24. Include each pregnant and postpartum person and their identified support person(s) as respected members of and contributors to the multidisciplinary care team

6. Develop Trauma-Informed Protocols and Training to Address Health Care Team Member Biases to Enhance Quality of Care

A cardio-obstetric emergency exposes patients and families to increased stress and trauma, which may include difficult prognoses or unexpected news. Training professionals on techniques to support trauma-informed care, such as appropriate screening and signs and risk factors for trauma, as well as establishing processes for effective communication and referrals, are practical ways to engrain these principles into clinical care.^{17,18} Training in trauma-informed care, implicit bias, and anti-racism may optimize health care professionals' approaches to care and increase awareness of patient groups who are vulnerable to discrimination related to race, ethnicity, education level, weight, English language proficiency, or other identities and factors that can affect care.^{19,20}

Box 2. Abnormal Examination Findings Indicating a Need for Immediate Evaluation for Cardiac Conditions in a Pregnant or Postpartum Patient

- Abnormal murmur (diastolic murmur or systolic murmur greater than 2/6)
- Pulmonary rales
- Jugular venous distention
- Peripheral cyanosis

Data from Deen J, Albright CM, Chandrasekaram S, Stout K. Heart disease in pregnancy. In: Gabbe SG, editor. *Obstetrics: normal and problem pregnancies*. Elsevier; 2021. p. 814–38.

7. Develop and Maintain a Set of Referral Resources and Communication Pathways Between Obstetric Professionals, Community-Based Organizations, and State and Public Health Agencies to Enhance Quality of Care

Patients experiencing pregnancy complications due to cardiac conditions and their support networks may require material, emotional, and social supports as they cope with sequelae of the emergency. Although each practice may not be able to maintain and manage a comprehensive resource inventory of services, such information may be available through the hospital social work team, local health departments, maternal-child health coalitions, and other community agencies.

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

8. and 9. Obtain a Focused Pregnancy and Cardiac History in All Care Settings, Including Emergency Department, Urgent Care, and

Box 3. Warning Signs for an Imminent Cardiac Event

- Shortness of breath at rest
- Severe orthopnea using 1 or more pillows
- Resting heart rate 120 bpm or higher
- Resting systolic blood pressure 160 mm Hg or higher
- Resting respiratory rate 30 or higher
- Oxygen saturation rate 94% or lower with or without personal history of CVD

bpm, beats per minute; CVD, cardiovascular disease. Data from California Maternal Quality Care Collaborative. Improving healthcare response to cardiovascular disease in pregnancy and postpartum. Accessed June 16, 2022. <https://www.cmqcc.org/resources-toolkits/toolkits/improving-health-care-response-cardiovascular-disease-pregnancy-and>

Primary Care, for Reproductive-Aged Patients Regardless of Cardiac Symptoms

Individuals with symptoms of pregnancy-related complications or concerns may enter the health care system at different access points depending on the severity of symptoms and individual access to care. A recent pregnancy may not be apparent to a health care professional or recognized by a patient themselves as relevant to their current symptoms. Obtaining a focused pregnancy and cardiac history for reproductive-aged patients presenting for care is vital to understanding an individual's cardiac risk in all care settings. Questions to ask patients may include, "Are you currently pregnant, or have you been pregnant within the last year?" and "Do you have a personal history of cardiac disease?" Referral to a cardiologist may be indicated depending on the significance of obstetric and cardiac factors identified during the assessment.

In the primary care setting, a history of adverse pregnancy outcomes may guide patient counseling about risk of future cardiac disease and recommendations for immediate or follow-up care.¹⁴

10. Assess Whether Escalating Warning Signs for an Imminent Cardiac Event are Present

Pregnant and postpartum people presenting to any care setting with acute cardiac symptoms or abnormal examination findings should be evaluated promptly for cardiac disease as detailed in Boxes 2 and 3.⁹

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.

12. Conduct a Risk-Appropriate Workup for Cardiac Conditions to Establish a Diagnosis and Implement the Initial Management Plan

The initial evaluation for anyone presenting with red flag symptoms, concerning physical examination findings, or multiple abnormal symptoms, vital signs, or risk factors indicating nonemergent or prompt evaluation, as indicated in Figure 1, require appropriate testing and care. The underlying cardiac condition and symptomatology at presentation guide the type and timing of testing.¹⁰ Further testing to evaluate for alternate diagnoses or comorbid medical conditions may be indicated pending primary test results and ongoing or

escalating symptoms. Referral to a Pregnancy Heart Team or cardiologist may be indicated.

13. Screen Each Person for Comorbid Conditions and Risk Factors for Cardiac Conditions and Provide Linkage to Community Services and Resources for Comprehensive Care

Medical conditions such as anemia, asthma, bleeding, embolism, infection, thyroid disorders, metabolic disorders, and hypertensive disorders of pregnancy may mimic the symptoms of cardiac conditions in pregnancy and postpartum or present as comorbidities.^{9,10} Screening for comorbid conditions and risk factors for cardiovascular disease may allow for identification and alteration of the management plan. For example, substance use can be associated with cardiac conditions, such as arrhythmias (cocaine, opioids, amphetamines, chronic alcohol use), hypertension (cocaine, amphetamines), endocarditis or valvular heart disease (intravenous drug use), acute heart failure (amphetamines), and dilated cardiomyopathy (amphetamines).²¹ A comprehensive care plan would also address the comorbid condition of substance use disorder with linkage to treatment.

Patients who have experienced cardiac conditions during the peripartum period may experience mental health comorbidities after their cardiac diagnoses.²² Mental health symptoms often go underrecognized and undertreated by health care professionals. Pregnant and postpartum patients should therefore be screened for mental health disorders and referred to appropriate follow-up care if they screen positive.

RESPONSE

14. Implement Facility-Wide Standard Protocols With Checklists and Escalation Policies for Management of Cardiac Symptoms

Considerations for facility-wide standard protocols for rapid identification of cardiac symptoms are detailed in Readiness Element 2 and ACOG Practice Bulletin No. 212 (see <https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2019/05/pregnancy-and-heart-disease>).¹⁰ The use of carefully designed, tested, and implemented checklists in other disciplines has been shown to improve processes of care and professionals' satisfaction in clinical settings.²³ In a literature review of 15 studies evaluating the effectiveness of e-checklist use, 14 of the 15 studies found some benefit to their use.²⁴ Considerations and guidance for developing checklists in obstetrics may include targeting

processes and procedures that are performed in high-stress or time-critical situations, such as the care of patients in cardiac crisis.^{25,26}

15. Implement Facility-Wide Standard Protocols With Checklists and Escalation Policies for Management of People With Known or Suspected Cardiac Conditions

Patients with known or suspected cardiac conditions who present in cardiac crisis require rapid evaluation and timely intervention based on standard protocols. Further detail on facility-wide standard protocols and structures to enable multidisciplinary management of cardiac conditions in pregnant and postpartum people can be found in Readiness Elements 2, 4, and 5 and Response Element 14.

16. Coordinate Transitions of Care, Including Discharge From the Birthing Facility to Home and Transition From Postpartum Care to Ongoing Primary and Specialty Care

Early postpartum visits with an obstetric care professional, primary care professional, or cardiologist are recommended within 7 to 10 days of delivery.¹⁰ Health care professionals can take an individualized and risk-appropriate approach to postpartum care comprised of an early assessment at or before 3 weeks postpartum, followed by touchpoints as needed, culminating with a comprehensive visit no later than 12 weeks postpartum.²⁷

Beyond the first year postpartum, patients with known cardiac conditions and complications during pregnancy will benefit from lifelong specialized care and smooth transitions between obstetric care, primary care, and cardiology professionals.²⁸

17. Offer Reproductive Life Planning Discussions and Resources, Including Access to a Full Range of Safe and Effective Contraceptive Options

Data indicate that patients with chronic conditions have increased understanding of risk in pregnancy when provided with a reproductive life plan and supportive counseling.²⁹ This process includes counseling regarding reproductive risks with a given medical condition. Several standardized tools are available to support reproductive life planning discussions between patients with cardiac conditions and their cardiology and obstetric care professionals. In patients with pre-existing cardiovascular disease, risk assessment may be performed using existing tools such as CARPREG II, ZAHARA, and mWHO (Modified World Health Organization Classification of Maternal

Cardiovascular Risk) to counsel patients about anticipated risk to allow for informed decision making.^{30–32}

Contraception planning and education requires input from the obstetrician–gynecologist, cardiologist, and patient, especially for patients with complex congenital heart conditions.³³ Tools such as the U.S. Medical Eligibility Criteria for Contraceptive Use (see <https://www.cdc.gov/reproductivehealth/contraception/mmwr/mec/summary.html>) and guidance from the American Heart Association (see <https://www.ahajournals.org/doi/full/10.1161/CIRCULATIONAHA.111.070607>) may be used to determine eligibility for and contraindications to different methods of contraceptive care for patients who do not want to become pregnant.^{34,35} Reproductive planning may also include access to abortion care for those who choose not to continue a pregnancy.

18. Provide Patient Education Focused on Life-Threatening Postpartum Complications and Early Warning Signs, Including Instructions for Whom to Notify if They Have Concerns, and Importance of a Scheduled Postpartum Visit

Reviews of maternal mortality in the United States include recommendations to provide patient education on early warning signs and symptoms of life-threatening postpartum complications.³⁶ Educational materials that are appropriate to use with patients are outlined in Readiness Element 3. Education on signs and symptoms should be stratified to include whether concerns may be appropriately addressed in an outpatient setting or if emergency care is needed.

Education throughout pregnancy and before hospital discharge should include anticipatory guidance on the value and timing of a postpartum visit.²⁷ In instances in which a postpartum visit is scheduled prenatally or before hospital discharge, health care professionals may provide verbal reminders as well as reminders using technology such as email, text, and apps in the days leading up to the appointment, so that the patient is aware of their scheduled appointment and its importance.

REPORTING AND SYSTEMS LEARNING

19. For Pregnant and Postpartum People at High Risk for a Cardiac Event, Establish a Culture of Multidisciplinary Planning, Admission Huddles, and Postevent Debriefs

Multidisciplinary planning for people with acquired and congenital cardiac disease, as well as for those

with cardiac risk factors, contributes to better assessment of patient needs and may improve outcomes during pregnancy and postpartum.³⁷

Huddles on admission and at shift changes help to communicate patient needs, coordinate multidisciplinary care, and review ongoing quality issues and opportunities among health care professionals.³⁸ Admission and shift huddles also provide opportunities to plan care based on patient risk.³⁹ As health care professionals implement initial management plans for pregnant and postpartum patients with cardiac conditions or when signs and symptoms of an emergent cardiac event are present, it may be helpful to conduct additional, as-requested safety huddles to communicate and plan escalations of care.

Multidisciplinary debriefing should occur after all health care–related adverse events. Documentation of actionable follow-up items identified during the interdisciplinary debrief is important to improve processes and can frame future skill-building to support early identification of risk and prompt intervention for cardiac conditions in pregnancy and postpartum.

20. Perform Multidisciplinary Review of Serious Complications to Identify Systems Issues

Serious events that result in missed opportunities to optimize care or significant morbidity or mortality should be reviewed by a multidisciplinary group with authority to implement identified process changes. Root-cause analysis of adverse cardio–obstetric incidents and related complications, such as intensive care unit admission, should be performed and documented for quality improvement.

21. 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

Data support evaluation of processes of care and drive quality-improvement activities. Disaggregating data by race and ethnicity and other patient demographics, such as educational level or insurance status, is one way to identify inequities.^{40,41} To improve the quality of race and ethnicity data in the patient record, patients may self-record their race and ethnicity using patient-facing tools.^{41,42} If staff collect patient race and ethnicity data, training to support respectful collection of such data directly from patients may improve the completeness and quality of the data.^{43,44} Efforts should be made to consider processes of care and

patient outcomes in the context of race, ethnicity, and social and structural determinants of health in other areas of reporting and systems learning, such as in multidisciplinary case reviews.⁴⁴

RESPECTFUL CARE (EVERY HEALTH CARE PROFESSIONAL, TEAM MEMBER, AND CARE SETTING)

22. Screen for Structural and Social Determinants of Health That Might Influence Clinical Recommendations or Treatment Plans and Provide Linkage to Resources That Align With the Pregnant or Postpartum Person's Literacy, Cultural Needs, and Language Proficiency

Health systems should have mechanisms to consistently screen pregnant and postpartum people for structural and social determinants of health (SDOH) incorporated into clinical care and quality-improvement efforts. Standardized tools exist for screening for SDOH needs, such as the PRAPARE tool (Protocol for Responding to and Assessing Patients' Assets, Risks and Experiences), The EveryONE Project, and the Centers for Medicare & Medicaid Services' AHC-HSRN (Accountable Health Communities Health-Related Social Needs Screening Tool).⁴⁵

Direct provision of or referral to resources as identified and developed under Readiness Element 7 is an appropriate response to SDOH needs. Resource development and referral should be tailored to patients' unique needs, and resources should be accessible to patients with different literacy and language proficiencies and cultural needs.

23. Engage in Open, Transparent, and Empathetic Communication With Pregnant and Postpartum People and Their Identified Support Teams to Promote Understanding of Diagnosis, Options, and Treatment Plans

Effective communication supports accurate diagnoses and enhances patients' understanding of their options and shared decision making.⁴⁶ Health care professionals can co-create an environment for open, shared communication with patients by implementing patient-centered communications techniques, such as speaking in plain language and asking open-ended questions to better understand concerns and priorities.⁴⁶ Professionals in all health care settings should be prepared to care for and communicate effectively with people with limited English proficiency as well as those whose language preferences may change through the duration of their encounter for care.⁴⁴

24. Include Each Pregnant or Postpartum Person and Their Identified Support Person(s) as Respected Members of and Contributors to the Multidisciplinary Care Team

Patients and their identified support networks can be included as contributors to their multidisciplinary care team through communication, the use of shared decision making, and the inclusion of patient perspectives in quality improvement. The use of the teach-back method and decision aids may support understanding of options and increase patient engagement in shared decision making, and the inclusion of patients and their identified support networks in bedside safety huddles may encourage ongoing multidisciplinary planning and communication.^{44,47,48} Patient and community representation as part of multidisciplinary reviews of morbidity and mortality provides opportunities for patient perspectives to inform quality-improvement processes.⁴⁹

DISCUSSION

The goal of the Cardiac Conditions in Obstetric Care patient safety bundle is to identify patients at risk for imminent cardiac crisis, recognize risk of future cardiac threats, and intervene early to mitigate risk to improve outcomes and decrease preventable severe maternal morbidity and mortality. The scope of this bundle goes beyond obstetric care professionals to include primary care, emergency care, and urgent care professionals, particularly in the postpartum period. Implementation requires a multidisciplinary approach, with engagement of nonobstetric care professionals at all touchpoints of care. This patient safety bundle provides standardized practices for assessment of cardiac conditions in pregnancy and the postpartum period, early intervention in escalating symptoms, and response to unexpected outcomes.

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