



The contemporary cardio-obstetrics team: The path to improving maternal outcomes in high-risk patients

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ABSTRACT The field of Cardio-Obstetrics is focused on mitigating cardiovascular risk among pregnant and post-partum individuals. Due to the complexity of caring for pregnant people with acquired or congenital cardiac disease, patients with these conditions are increasingly managed in multidisciplinary Cardio-Obstetrics teams, which are now considered essential to optimize maternal care in high-risk patients. Cardio-Obstetrics teams are composed of multiple subspecialists and have at least 3 roles: (1) provide preconception counseling and risk stratification to patients with known cardiac disease, (2) organize prenatal and postpartum care for patients who develop or present with cardiac disease during pregnancy, and (3) plan for emergent care for patients whose pregnancy “unmasks” cardiac disease, whether acquired disease or an unknown ACHD. Here we describe our experience at Einstein/Montefiore to aid other institutions in developing their own programs. (Am Heart J 2025;281:140–148.)

Background

Although inpatient maternal deaths at the time of delivery hospitalization have declined 50% in the United States from 1995 to 2015,¹ rates of maternal mortality during the antenatal and postpartum periods did not demonstrate similar declines. These findings suggest improvements in intrapartum care have been offset by countervailing increases in deaths from causes that are not classically obstetric (ie, causes beyond hemorrhage, amniotic fluid embolism, and preeclampsia), and occurring preceding delivery and in the postpartum period, rather than at time of delivery itself. For all pregnant people, cardiovascular conditions have now become a leading cause of pregnancy-related deaths; for Black birthing people, they are the leading cause.

Factors associated with these patterns of maternal mortality associated with cardiovascular complications include advanced maternal age, pre-existing coronary heart disease, and maternal comorbidities such as diabetes and obesity.² Furthermore, as surgical techniques for treat-

ing congenital heart conditions advance, individuals with Adult Congenital Heart Disease (ACHD) are surviving more often into their reproductive years.³

The normal physiologic changes that occur during pregnancy include significant cardiovascular hemodynamic demands that are typically well tolerated by most healthy individuals. Pregnancy-induced changes include a significant increase in cardiac output, stroke volume, circulating blood volume, heart rate, and oxygen consumption. There is also a distinct decrease in systemic vascular resistance resulting in low blood pressure primarily in the second trimester. These expected hemodynamic changes can unmask unknown CVD or worsen pre-existing CVD.^{4,5} For this reason, patients with cardiovascular disease at risk for decompensation related to the hemodynamic demands of pregnancy should be managed by specialists with a clear understanding of the relevant pathophysiology.

The field of Cardio-Obstetrics is focused on mitigating cardiovascular risk among pregnant and postpartum individuals. Management of these patients starts during preconception and continues throughout pregnancy, labor and delivery (L&D), and the postpartum period (Figure 1).⁶ In addition, pregnancy is considered a window of opportunity to identify patients at long-term risk for CVD. Postpartum patients who suffered an adverse pregnancy outcome (APO), for example an intrauterine demise, are at increased risk for future cardiovascular disease. This is a cohort of patients that can benefit from specialized care past their reproductive years.⁷

Due to the complexity of caring for pregnant people with varying forms of acquired or congenital cardiac

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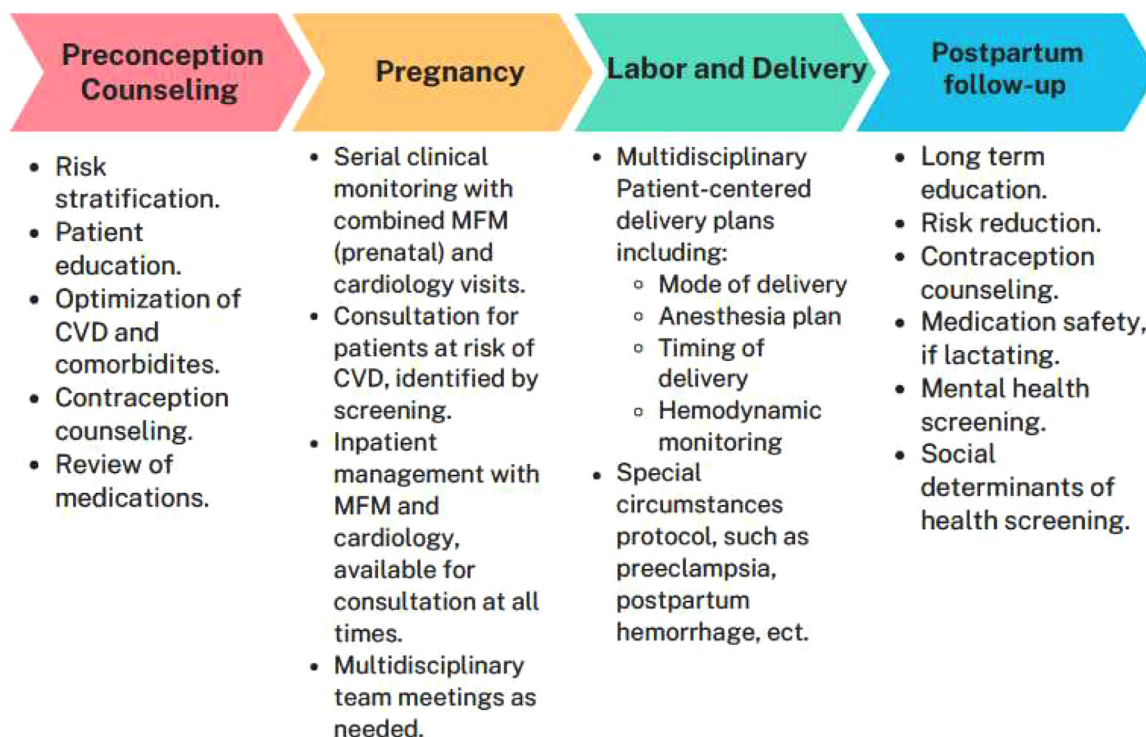
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Figure 1. Stages of pregnancy and interaction with the Montefiore medical center/Albert Einstein college of medicine Cardio-Obstetrics team.

The Cardio-Obstetrics Team



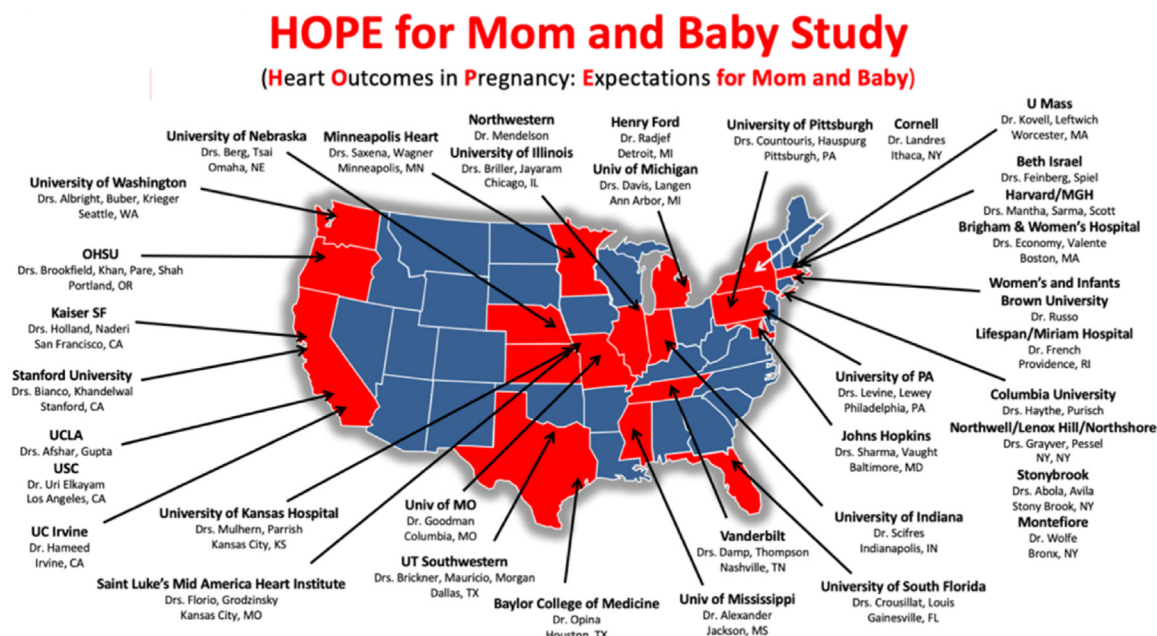
disease, patients with these conditions are increasingly managed in multidisciplinary Cardio-Obstetrics teams, focused on delivering the best evidence-based care available in a coordinated fashion to high-risk patients.⁸ Cardio-Obstetrics teams are composed of multiple subspecialists and have at least three roles: (1) provide preconception counseling and risk stratification to patients with known cardiac disease, (2) organize prenatal and postpartum care for patients who develop or present with cardiac disease during pregnancy, and (3) plan for emergent care for patients whose pregnancy “unmasks” cardiac disease, whether acquired disease or previously undiagnosed ACHD.⁸ While there is no comprehensive census of extant Cardio-Obstetrics teams in the United States, many are participating in the Heart Outcomes for Pregnancy Expectations for Mom and Baby Project (HOPE) led by Dr. Karen Florio of Kansas City, Missouri (Figure 2). The components of the team vary across institutions, but at a minimum should include representation from Cardiology, Maternal Fetal Medicine (MFM), Anesthesia, Nursing, Labor and Delivery (L&D), and Obstetricians.⁸ Additional expertise from Pharmacy, Blood Bank, Neonatology, Social Work, and cer-

tain surgical sub-specialties may be needed for specific patients.⁹

The Montefiore medical center/albert Einstein college of medicine cardio-obstetrics team

Creating the cardio-obstetrics team

The ideal place for the creation of a Cardio-Obstetrics center is at a center where all subspecialists are readily available and accessible; successful programs have been developed in both university-based and community-based settings.¹⁰ The Cardio-Obstetrics team at Montefiore Medical Center/Albert Einstein College of Medicine was created in 2015. Our mission statement, which aligns with our institution and department, was to create a multidisciplinary referral center for high-risk pregnant patients with cardiac disease. With support from our division and department chairs, our goal remains to provide evidence-based care and reduce maternal morbidity and mortality. Our model includes integrated outpatient prenatal visits with board-certified MFM specialists and

Figure 2. HOPE site participation and representative PIs.

cardiologists as appropriate (eg, Structural Heart Disease, ACHD, and Heart Failure).

The Cardio-Obstetrics team conducts monthly scheduled MDT meetings. The highest at-risk pregnant cardiac patients, those with modified WHO risk scores of II-III and above,¹¹ are introduced and discussed. Each of these patients receive a detailed delivery plan, which is incorporated into their medical record. Patients who have a mWHO score less than II but are at high risk for peripartum maternal cardiac events because of comorbidities may also be cared for by the multidisciplinary team.

The Cardio-Obstetrics team has a role in both the outpatient and inpatient settings, and within the Cardio-Obstetrics team, everyone's specific roles help to optimize patient care (Figure 3). During our MDT meetings, the MFM team initiates the case presentation and plan of care during the pregnancy, and we review the Cardio-Obstetrics checklist and CVD risk screening tool. (Figures 4 and 5). Specific cardiac studies are reviewed together, guided by the cardiology partners who assist in interpretation and further explanation of test results. The cardiologist, anesthesiologist, and MFM specialists discuss concerns regarding physiologic changes during pregnancy, delivery, and peripartum. This will ultimately provide enough information for the multidisciplinary team to develop a detailed plan of care.⁸ In the event of an emergent case, when a pregnant or postpartum patient presents with a cardiac concern and requires an im-

mediate plan, emergent ad hoc multidisciplinary meetings are held virtually.

Since we started our program in 2015, the proportion of patients at Einstein/Montefiore who are seen for symptoms that mimic CVD but are found not to have any cardiac pathology has increased (Table 1). We hypothesize this is a result of greater awareness among obstetric providers and the implementation of universal CVD screening at our institution. Another proposed explanation is most referrals to our Cardio-Obstetrics office come from the Department of Obstetrics & Gynecology while previously they might have been referred directly to the general cardiologists.

Cardio-obstetrics team patient management

Preconception counseling

The goal of preconception care is to optimize maternal health prior to a future pregnancy, prevent maternal cardiac events, and ultimately improve future maternal and neonatal outcomes (Figure 1).¹² In our Cardio-Obstetrics program, preconception visits are opportunities to educate patients about pregnancy in the context of chronic disease and optimize the patients' health in preparation for pregnancy. Patient education includes a review of the hemodynamic changes in pregnancy, with emphasis on the impact to the heart and how it could affect their cardiac condition. We discuss how symptoms and warning

Figure 3. Roles within our cardio-obstetrics team.



Figure 4. Screenshot of CVD risk screen algorithm in the EMR.

OB CVD ASSESSMENT

Pull Data from Chart Pull Data from the chart for 1st assessment of cardiovascular risk. To reassess risk, data items must first be cleared before this button is used to recheck data

Self Reported Symptoms (*NYHA Class Vital Signs > = II)

Suggestive of Heart Failure

Resting HR >= 110 bpm ☐ Yes ☐ No

Shortness of breath ☐ Yes ☐ No

Short of breath lying flat ☐ Yes ☐ No

Rapid heart rate ☐ Yes ☐ No

Asthma unresponsive to therapy ☐ Yes ☐ No

Suggestive of Arrhythmia

Palpitations ☐ Yes ☐ No

Fainting or loss of consciousness ☐ Yes ☐ No

Suggestive of Coronary Artery

Chest pain ☐ Yes ☐ No

Physical Exam

Heart: Loud murmur ☐ Yes ☐ No

Lungs: Basilar crackles ☐ Yes ☐ No

Risk Factors

Age 40+ ☐ Yes ☐ No

African American ☐ Yes ☐ No

Pre-pregnancy obesity (BMI >=35) ☐ Yes ☐ No

Pre-existing diabetes ☐ Yes ☐ No

Hypertension ☐ Yes ☐ No

Cancer Diagnosis or History ☐ Yes ☐ No

History of chemotherapy or chest radiation ☐ Yes ☐ No

Substance Use

Nicotine use: ☐ Yes ☐ No

Alcohol use: ☐ Yes ☐ No

Use of risky drugs: Cocaine, Depressants (Alcohol), ☐ Yes ☐ No

Mark All Symptoms Negative

Figure 5. The Montefiore medical center/Albert Einstein college of medicine cardio-obstetrics checklist.

Attendees: Services Represented ☐ MFM ☐ Cardiology ☐ L&D Att ☐ L&D Director ☐ Patient Safety ☐ Anesthesia ☐ Pediatrics ☐ L&D Nursing ☐ Blood Bank ☐ Other _____		Date and Time of IOL or CD: (check one) ☐ Date _____ ☐ Time _____		Place of Delivery: ☐ Weiler ☐ Wakefield	
Patient Information Name _____ MRN _____ Age _____ EDC _____ BMI _____ Parity _____ Health Care Proxy _____ Major Medical Co-Morbidities _____ Prior Cardiac Surgery _____ Prior Cardiac Disease _____ Birth Control Recommendation _____ Birth Control Plan _____ Desire future fertility? ☐ Yes ☐ No BTL papers signed? ☐ Yes ☐ No		Intrapartum Plan: ☐ Yes ☐ No CCU ☐ Yes ☐ No Lines ☐ Yes ☐ No Fluid Monitoring ☐ Yes ☐ No If Yes: Pulse Oximetry Other _____ If Yes ☐ Telemetry ☐ Cardiac If Yes ☐ CVP ☐ A-line ☐ Other _____ If Yes ☐ Strict I/O ☐ Other _____			
		Postpartum Plan: ☐ Yes ☐ No CCU ☐ Yes ☐ No Lines ☐ Yes ☐ No Fluid Monitoring ☐ Yes ☐ No If Yes: Pulse Oximetry Other _____ If Yes ☐ Telemetry ☐ Cardiac If Yes ☐ CVP ☐ A-line ☐ Other _____ If Yes ☐ Strict I/O ☐ Other _____			
Cardiac Studies Structural heart disease? ☐ Yes ☐ No Arrhythmia? ☐ Yes ☐ No Maternal Echocardiogram: _____ Holter: _____ Fetal Echo: _____		Summary of Delivery Plan Overall Risk of Mortality: ☐ High ☐ Moderate ☐ Low Mode of Delivery: ☐ Safe to Labor ☐ Cesarean ☐ Assisted Second Stage Special Situation: Preeclampsia _____ Hemorrhage _____ Medication to Avoid _____ Anesthesia: ☐ Regional ☐ General ☐ Other _____			
		EMERGENCY PLAN Back-Up ☐ Cardiologist _____ ☐ Critical Care _____ ☐ Anesthesia _____ ☐ Other _____			
Disclaimer: The above is intended to serve as guidelines and not intended to be a standard of care. Care should be based on the judgment of the physician based on the individual patient's condition.					

signs of worsening cardiac disease may mimic symptoms of normal pregnancy.⁵ Preconception counseling is not only important for patients with known CVD, but also for patients who have had adverse pregnancy outcomes and are now at risk for developing CVD.⁷

While patients may be reasonably advised that delivery and postpartum planning would evolve over the course of pregnancy, it is often helpful for establishing expectations during pregnancy by counseling that a cesarean delivery is rarely necessary for cardiac indications alone (ie, is usually reserved for standard obstetric indications) and that vaginal delivery is associated with improved outcomes for many patients. Similarly, patients can also be informed on updated breastfeeding recommendations.

Medication review and optimization is an important component of this care. For example, a heart transplant patient must discontinue mycophenolate due to its teratogenic effects; in this situation, the Cardio-Obstetrics team must work closely with the patient's transplant cardiology team to ensure there is no transplant rejection. A more common situation is the need to adjust antihypertensive medications such as transition from angiotensin-converting-enzyme Inhibitors or angiotensin II receptor blockers to a beta blocker or calcium channel blocker.

Risk assessment is an important component of preconception planning. Tools such as the Modified WHO (mWHO), ZAHARA, and CARPREG II are used to stratify risk in this patient population and predict maternal outcomes. Each of these tools has unique features.

For example, mWHO focuses on clinical diagnosis and provides general strata of risk, ranging from I (no detectable increased risk of maternal mortality and no or mild increase in morbidity) to IV (extremely high risk of maternal mortality or severe morbidity; pregnancy considered contraindicated). ZAHARA and CARPREG II are additive, point-based systems which provide predicted risk.⁸ ZAHARA is used for women with ACHD while CARPREG II apply to all women with cardiac disease.¹³ Individual complexity may require tailored risk assessment to capture all considerations for delivery planning.¹³ Further risk stratification specific to cardiovascular conditions may include biomarkers such as NT-proBNP and NYHA Functional Class as needed. A patient's co-morbidities also should be factored into cardiac risk stratification.¹³ Counseling women who are considered mWHO IV, where a pregnancy would be contraindicated due to the very high risk of morbidity and mortality, should include alternative options for planning a family (adoption or surrogacy).

Pregnancy

For most patients with CVD, a Cardio-Obstetrics clinic visit at least once per trimester is warranted, and patients are seen simultaneously by both MFM and Cardiology. The encounter is billed separately by each physician. Patients benefit from this coordination by having fewer clinical encounters and an in-person open dialogue between both subspecialists who counsel, assess, and review the plan of care together in real time.

Table 1. New consults and cardiac disease, maternal fetal medicine joint program, Albert Einstein college of medicine, Bronx, NY 2015-2023

Cardiac disease	2015 N = 61	2016 N = 75	2017 N = 101	2018 N = 110	2019 N = 147	2020 N = 177	2021 N = 192	2022 N = 230	2023 N = 203	Examples
Benign	42% (26)	4% (3)	30% (30)	36% (40)	38% (56)	54% (96)	51% (99)	69% (154)	43% (88)	Syncope, Palpitations, Murmur, Shortness of Breath
ACHD	24% (15)	30% (23)	25% (25)	21% (23)	25% (36)	17% (30)	13% (24)	14% (32)	18% (36)	TOF, Marfan, VSD, Ebstein, Subaortic, AV Canal Defect, Uncorrected PDA
CM	6% (4)	9% (7)	10% (10)	5% (5)	10% (14)	6% (12)	7% (12)	5% (12)	9% (18)	Prior PPCM, New Diagnosis, Heart Transplant
Arrhythmia	6% (4)	29% (22)	19% (19)	18% (20)	10% (15)	12% (22)	8% (16)	7% (17)	19% (9)	Brugada, WPW, Prolonged QT, Heart Block, SVT
Valvular	8% (5)	3% (2)	9% (9)	2% (2)	10% (14)	3% (5)	2% (4)	1% (3)	2% (4)	Rheumatic, Septic Infection
Vascular	11% (7)	24% (18)	8% (8)	18% (20)	5% (11)	6% (12)	19% (37)	5% (12)	19% (38)	Hypertensive Disorders of Pregnancy, Prior MI, Pulmonary HTN

Abbreviations: ACHD, adult congenital heart disease; AV, atrioventricular; CM, cardiomyopathy; HTN, hypertension; TOF, tetralogy of Fallot; PDA, patent ductus arteriosus; MI, myocardial infarction; PPCM, peripartum cardiomyopathy; SVT, supraventricular tachycardia; VSD, ventricular septal defect; WPW, Wolff-Parkinson-White syndrome.

A delivery plan is outlined in the patient's medical record starting at the time of gestational viability, considered to be at around 24 weeks gestational age at our center.⁸ Depending on the complexity of the case, delivery planning may need to occur earlier. If the patient requires additional obstetric procedures during pregnancy, such as cerclage placement or amniocentesis, the Cardio-Obstetrics team will meet and tailor a safe plan for the required procedure(s).

Patients with more complex cardiac issues receive specialized care. For example, the team assembled for a cardiac transplant patient would include the transplant cardiologist who has followed the patient. Additional considerations would include transplant graft integrity assessment and a review of medications to plan for adjustments as alteration of the medication regimen can heighten the risk of organ rejection. For example, those who are on mycophenolate must discontinue due to its teratogenic effects, which include miscarriage, congenital malformations including facial clefts, heart defects, and abnormal ear development.^{14,15} During a transition period of medication modification, the patient would then be closely monitored for any signs or symptoms of transplant rejection.

We have an inpatient antepartum team and unit who care for all pregnant cardiac patients when inpatient admission is required, and both Cardiology and MFM are always available for inpatient consultations.

CVD risk screening during pregnancy

Hemodynamic changes during pregnancy can unmask de novo or acquired CVD, and thus pregnancy is an opportunity for recognition of CVD and prevention of chronic disease.¹⁶ Many institutions have incorporated the use of the cardiovascular screening tool created by the California Maternal Quality Care Collaborative (CMQCC) that identifies patients at risk for CVD and who may benefit from further cardiac evaluation in pregnancy or the postpartum period.¹⁶ Identification of patients with true CVD can change medical management prior to delivery and improve perinatal outcomes. It also increases provider and patient awareness of CVD risk factors and introduces an important opportunity for patient education and risk reduction.¹⁷

A pilot study testing the CMQCC Cardiovascular Disease Toolkit at 2 institutions, University of California, Irvine and Montefiore Medical Center (MMC), found that 8% of patients screened positive. Among those who were referred to Cardio-Obstetrics for consultation, 30% had true cardiac pathology.¹⁶ This pilot study provided data for an NIH grant funding for our research group to validate the CMQCC Cardiovascular Disease Toolkit in a larger patient population. The CMQCC CVD screening tool is now embedded within all pregnant and postpartum patient's electronic health record and associated with all pregnancy episodes at MMC. To date, we have

screened over 2500 pregnant and postpartum patients, of whom 230 have screened positive for being at risk and of whom 40 were true positives and now are on cardiac medications and receiving care with our Cardio-Obstetrics team.

Patients with a pregnancy that is considered mWHO IV may receive counseling on the termination of pregnancy. If the patient decides on termination of pregnancy, the Cardio-Obstetrics team will hold a multidisciplinary meeting to plan a safe and effective evacuation of the uterus. In selected cases, even in early pregnancy uterine evacuation is recommended in an operating room rather than ambulatory care setting for improved cardiac monitoring.

Labor and delivery

Delivery planning includes a review of timing of delivery, location of delivery, mode of delivery, postpartum recovery, telemetry versus more intense cardiac monitoring, and other concerns, which are documented in each patient's medical record.¹⁸ A summary of key points to consider, special situations like preeclampsia and postpartum hemorrhage, medications and fluid management, and type of line placement are also documented as a resource for the delivery team. Nursing leadership facilitates medication availability and 1:1 cardiac nursing on L&D.

Postpartum follow-up

The delivery plan also specifies immediate postpartum evaluation and management. Due to the large fluid shifts that occur the first days postdelivery, patients are monitored closely for clinical decompensation, including heart failure and arrhythmia. For example, at our institution, a patient with severe mitral stenosis will be transferred to the Cardiac ICU immediately after delivery while a patient with prior peripartum cardiomyopathy will be evaluated by the Heart Failure team in the days following delivery. These high-risk cardiac patients are managed by our High-Risk Obstetrics team rather than the standard postpartum service in the immediate days postdelivery.

While routine obstetric patients may not have a postpartum visit scheduled until the traditional 6 weeks postpartum visit, patients with cardiovascular disease can require a more extensive postpartum plan. In our practice, these patients are first seen within 10-14 days postdelivery, and then at 6 weeks, 12 weeks, and often 6 months postdelivery due to concern and risk of decompensation in the immediate postpartum period. Individual cases may require monthly visits postdelivery for the first 6 months and others may be followed out to a year. Often there is a need to adjust medication regimens that were not safe to take during pregnancy but are needed to optimize cardiac recovery or proceed with interventions that were postponed due to pregnancy. We recommend

a patient-centered model of care that tailors follow-up appointments with each subspecialist and assures transition of care to the appropriate service. For example, a complex adolescent congenital heart disease patient who is occupied with being a new mother and attending school will need additional support to assure contraceptive counseling and follow-up with the ACHD Specialist who will repeat an Event Monitor, ECHO, and often MRI of the heart.

Contraception options should ideally be discussed in the antepartum period, with an implementation plan set in place prior to L&D hospital discharge. Patients should be educated on their individual risk and have access to emergency contraception as needed.¹⁹ A retrospective review looking at contraception counseling in women of reproductive age with rheumatic or ACHD found that less than 40% had discussion of contraception with their cardiology provider.²⁰ The Cardio-Obstetrics team at our institution is responsible for facilitating shared decision making about contraception, reproductive life goals, and reproductive health considerations. The patient's values and preferences in combination with physician information and recommendations can accomplish this essential component of care. [Bedsider.org](https://www.bedsider.org) is an excellent resource for patients and providers for review of contraception options. The Medically Eligible Criteria for Contraceptive Use (MEC) chart uses a numeric system to indicate which cardiac conditions have no restriction for contraceptive use (number 1) versus those conditions that have an unacceptable risk if the method is used (number 4).²¹

Cardio-obstetrics team sustainability

The sustainability of a multidisciplinary team not only depends on the institution and stakeholders' commitment, but also on the ability to provide comprehensive healthcare to this unique population. It is important to understand the social factors determining the health of our patients and our communities' needs. Health-related social needs have been identified as root causes of disparities in health outcomes. Integrating social care by including community health workers (CHW) in the clinical team and implementing assistance initiatives can help sustain clinical programs.²² At our institution, the addition of community health workers has significantly benefited our Cardio-Obstetrics program by helping our patients navigate the health system, their medications, and scheduled appointments. The CHW team has established formal linkages between obstetrics, medical subspecialties, and financial assistance.

Clinical training in Cardio-Obstetrics is another crucial component for the longevity of a Cardio-Obstetrics center. Pregnant patients with complex CVD and associated risks require varying levels of expertise to address to their diagnoses and risk levels.⁶ There is currently an absence of structured training in Cardio-Obstetrics within

cardiology or maternal-fetal medicine fellowships.^{23,24} At our facility, in addition to caring for Cardio-Obstetrics patients in both inpatient and outpatient settings, our MFM Fellowship incorporates educational sessions covering cardiac disease in pregnancy, which is managed as a collaborative effort between MFM and Cardiology experts. The sessions encompass themes such as cardiovascular risk assessment, guidance on contraception, understanding the safety of cardiac medications during pregnancy and breastfeeding, changes in cardiometabolic health, and the impact of pregnancy complications on long-term cardiovascular well-being. Our MFM Fellowship also offers an elective in Cardio-Obstetrics that includes rounding in the CICU and exposure to reading echocardiograms. MFM and Cardiology fellows actively participate in monthly Cardio-Obstetrics multidisciplinary team meetings in which MFM fellows present the patient and identify obstetrical concerns, while Cardiology fellows and specialists present cardiac pathology, review, and explain diagnostic cardiac testing to help formulate a safe pregnancy and delivery plan.

Cardio-Obstetrics is a novel subspecialty with various opportunities for future research. Given the creation of the Cardio-Obstetrics team and centers around the nation, collaboration between centers is essential to develop an effective research network.²³ Research in the field should be focused on reducing maternal morbidity and mortality, improving fetal and neonatal outcomes, and reducing health disparities.²⁴ Previous literature has identified APOs such as preeclampsia, gestational diabetes, and preterm labor as risk factors for increasing long-term CVD risk, yet there is little research on how to reduce these risks.^{7,25} At our institution trainees are not only involved with research in this field, but also in quality improvement initiatives to improve maternal and neonatal outcomes and to educate providers and patients across the health system and community.

Conclusion/future directions

There is increasing evidence supporting the need for a comprehensive, multidisciplinary approach in the management of pregnant individuals with cardiac conditions. Cardio-Obstetrics programs are crucial to ensuring the thorough, multidisciplinary expertise needed to care for this population. Future directions include development of a Cardio-Obstetrics Fellowship that includes both MFM and Cardiology fellows working together to mirror the Cardio-Obstetrics team. Further research to examine the impact of Cardio-Obstetrics teams on mitigation of morbidity and mortality across the USA is needed.

Conflict of interest

None reported.

CRedit authorship contribution statement

Diana S. Wolfe: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Formal analysis, Data curation, Conceptualization. **Kerly Guerrero:** Writing – review & editing.

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