



# Importance of the Cardio-Obstetrics Team

*Anna Grodzinsky, MD MS<sup>1,2,\*</sup>*

*Karen Florio, DO<sup>1,2</sup>*

*John A. Spertus, MD MPH<sup>1,2</sup>*

*Tara Daming, MD<sup>1,2</sup>*

*John Lee, MD<sup>1,2</sup>*

*Valerie Rader, MD<sup>1,2</sup>*

*Lynne Nelson, APRN<sup>1,2</sup>*

*Rebecca Gray, RN<sup>1,2</sup>*

*Darcy White, RN<sup>1,2</sup>*

*Kate Swearingen, APRN<sup>1,2</sup>*

*Merrill Thomas, MD<sup>1,2</sup>*

*Annapoorna Singh, MD<sup>1,2</sup>*

*Anthony Magalski, MD<sup>1,2</sup>*

*Laura Schmidt, MD<sup>1,2</sup>*

## Address

<sup>1</sup>Saint Luke's Health System, Kansas City, MO, USA

<sup>2</sup>University of Missouri–Kansas City, Kansas City, MO, USA

Email: grodzinsky@umkc.edu

Published online: 10 December 2019

© Springer Science+Business Media, LLC, part of Springer Nature 2019

This article is part of the Topical Collection on *Pregnancy and Cardiovascular Disease*

**Keywords** Heart disease in pregnancy · Multidisciplinary approach · Cardio-obstetrics

## Abstract

**Purpose** In the USA, maternal mortality has been rising since the 1980s. Cardiovascular disease is recognized as the leading cause of this worrisome trend, and a multidisciplinary approach to the care of patients with cardiovascular conditions during pregnancy is becoming increasingly important. We outline the literature supporting this multidisciplinary approach, highlight our center's experience in building and expanding an integrated cardio-obstetrics practice, and provide guidance regarding patient selection and management within a combined practice.

**Summary** Antenatal management patterns and delivery planning for patients with cardiovascular disease during pregnancy vary substantially among cardiovascular and obstetric and maternal fetal medicine practices in the USA. The need for multidisciplinary care

between cardiologists and obstetricians is evident and has been supported by best practice statements from the American Heart Association, the American College of Obstetrics and Gynecology, and the Cardiac Disease in Pregnancy Study (CARPREG) investigators, whose CARPREG II risk score included “late first antenatal visit” as a predictor of adverse outcomes of pregnancy.

*Conclusions* We have solid evidence supporting a multidisciplinary approach to the care of patients with cardiac conditions in pregnancy. This approach is optimal because it facilitates a consistent and clear message to the patient (and those caring for each patient) regarding management and risks associated with pregnancy, as well as subsequent risk and postpartum follow-up. We support the extension of clinical collaboration between obstetricians and cardiologists to the research realm and know that working together to investigate the outcomes of moms with heart conditions and their babies will provide clinically meaningful information to support the care of these unique patients.

## Introduction

Maternal mortality in the USA is on the rise, representing the worst maternal mortality outcomes in the developed world [1]. Cardiovascular disease is recognized as the leading cause of maternal mortality in the USA [2]. The rising prevalence of cardiovascular conditions complicating pregnancy is influenced by advanced maternal age, established coronary heart disease, and increased risk factors for traditional coronary heart disease/arrhythmia [3]. In addition, given the advances in cardiothoracic surgery techniques to treat congenital heart conditions, there are now more adults living with congenital heart conditions than there are children, and a portion of these women with congenital heart conditions are now desiring pregnancy [4]. As such, a multidisciplinary approach to the care of this unique, growing group of patients is very important.

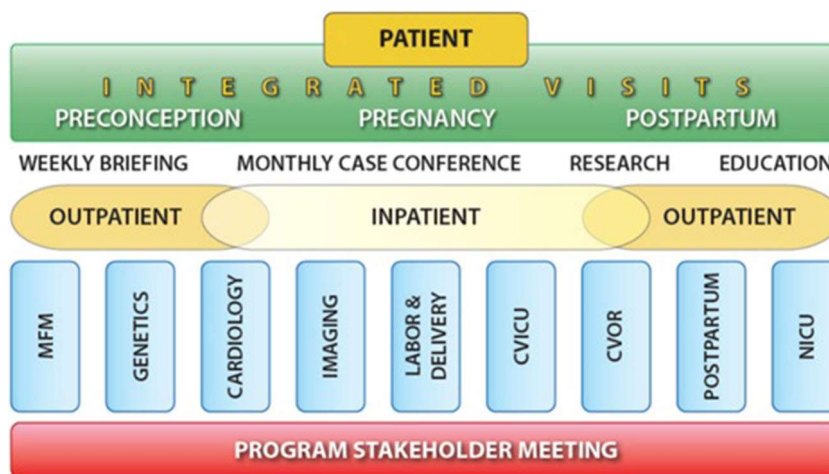
A cardio-obstetrics team requires effective communication and dedication to the cause of individualizing and optimizing care of each woman. Key team members should include cardiology and OB and/or maternal-fetal medicine specialists, nursing,

social services, anesthesiologist, neonatology, genetic counselors, and pharmacy [5]. Optimal team-based care involves regular multidisciplinary meetings, during which time these key stakeholders discuss patients with upcoming deliveries to reconcile a delivery plan: location of delivery (ICU versus labor and delivery), telemetry monitoring, mode of delivery (vaginal versus cesarean, vaginal or second-assisted stage), timing of delivery, anesthetic approach (regional versus general), postdelivery follow-up, and imaging recommendations [5].

Last year, the CARPREG investigators identified “late referral to a higher level of care” as a risk factor associated with worse maternal outcomes [6]. Providing a platform for a multidisciplinary approach to triaging patients’ appointments (nurse navigator role), arranging preconception and genetic counseling, managing maternal cardiac imaging and fetal echocardiograms/antenatal testing, and planning delivery and postpartum phases would be best coordinated in higher levels of care offering this multidisciplinary approach.

## Our experience

In 2014, our group recognized the growing need for an integrated cardio-obstetrics practice and began seeing patients in a coordinated clinic. To date, we have seen approximately 800 patients with various forms of heart disease throughout gestation. The program highlights are outlined in Fig. 1 and are



**Fig. 1.** The program highlights centered upon weekly briefing, monthly case conference, research, and education with a board-certified cardiologist and maternal-fetal medicine doctor.

centered upon weekly clinics, integrated appointments with a board-certified cardiologist and maternal-fetal medicine doctor, as well as on monthly interdisciplinary case discussions. We have evidence of increasing gestational ages, increased birth weights, and decreased cesarean sections (unpublished data) when care is integrated. Potential metrics for quality assessment and improvement include documenting patient satisfaction metrics, number of cesarean sections performed, number of patients delivered in the ICU, number of newborn ICU admissions, length of total (and ICU) length of stay, and maternal and neonatal deaths.

## Support from cardiovascular and obstetric medical societies and collaborative research

In the recent 2018 AHA/ACC Guidelines for the Management of Adults with Congenital Heart Disease Executive Summary, patients with complex congenital heart disease were noted to “have generally better outcomes when cared for in an integrated, collaborative, and multidisciplinary program.” This summary also supported “appropriate specialty care to address pregnancy and acquired cardiovascular disease.” [7]

In 2018, the American Heart Association and the American College of Obstetricians and Gynecologists (ACOG) published a Presidential Advisory entitled “Promoting Risk Identification and Reduction of Cardiovascular Disease in Women Through Collaboration With Obstetricians and Gynecologists.” [8] This statement described that most women of childbearing age consider their obstetrician/gynecologist (OB/GYN) to be their primary care provider and that accordingly, “collaboration among clinicians who care for women in order to improve quality and equitable healthcare gaps in women” is very important. This collaboration certainly applies to the care of our pregnant patients with cardiac conditions. Further, the cardio-obstetrics “subspecialty” has emerged as one supported by the American Heart Association scientific statement [8].

The collaboration between OB/MFM and cardiology has extended to the research realm. We have been able to leverage the remarkable enthusiasm surrounding the care of these very high-risk women to address our nation's worrisome trend surrounding maternal mortality. We have established a (now 50 site strong) national network of hospitals wherein a cardiologist and OB/MFM specialist team have committed to work together in order to contribute to the first multisite, multidisciplinary, prospective registry exploring outcomes of mothers afflicted with cardiovascular disease in the USA and their babies [9]. We look to the robust data that will be gathered within this research framework to help standardize the care of our patients and to support and extend existing guidelines in the USA regarding the care of pregnant women with cardiac disease. Finally, our scientific governing bodies, including ACOG, the Heart Failure Society of America, the Society for Maternal-Fetal Medicine, the American Heart Association, and the American College of Cardiology, have worked collegially and collaboratively to support research dissemination efforts arising from this cardio-obstetrics subspecialty, in effect, a "cross pollination." As such, obstetricians have been more often presenting at national scientific conferences traditionally focused on an audience of cardiologists, and in the same vein, cardiologists have had a more visible presence at conferences traditionally focused on obstetricians, gynecologists, and maternal-fetal medicine specialists. This effort and support from leaders within our subspecialties has contributed to furthering our joint understanding of how pregnancy-specific factors, such as preeclampsia, fetal growth restriction, and gestational diabetes, and preterm delivery may heighten cardiovascular risk later in life and in such how cardiovascular conditions influence outcomes of pregnancy.

## Conclusion

We have solid evidence supporting a multidisciplinary approach to the care of patients with cardiac conditions in pregnancy. This approach cannot be underscored as it facilitates a consistent and clear message to the patient (and those caring for the patient) regarding risks associated with pregnancy, as well as subsequent risk and most appropriate postpartum follow-up after delivery. We support the extension of this clinical collaboration between obstetricians and cardiologists to the research realm and know that investigating the outcomes of moms with heart conditions and their babies will provide the most clinically meaningful data to support the care of these unique patients.

## Compliance with Ethical Standards

### Conflict of Interest

Anna Grodzinsky, Karen Florio, John A. Spertus, Tara Daming, John Lee, Valerie Rader, Lynne Nelson, Rebecca Gray, Darcy White, Kate Swearingen, Merrill Thomas, Annapoorna Singh, Anthony Magalski, and Laura Schmidt each declare no potential conflicts of interest.

## Human and Animal Rights and Informed Consent

This article does not contain any studies with human or animal subjects performed by any of the authors.

## References and Recommended Reading

---

1. Centers for Disease Control and Prevention. Pregnancy mortality surveillance system. <https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-mortality-surveillance-system.htm>. Accessed August 13.
2. Wolfe DS, Hameed AB, Taub CC, Zaidi AN, Bortnick AE. Addressing maternal mortality: the pregnant cardiac patient. *Am J Obstet Gynecol*. 2019;220(2):167.e161–8.
3. Florio K, Daming TB, Grodzinsky A. Poorly understood maternal risks of pregnancy in women with heart disease. *Circulation*. 2018;137(8):766–8.
4. Ramage K, Grabowska K, Silversides C, Quan H, Metcalfe A. Association of adult congenital heart disease with pregnancy, maternal, and neonatal outcomes. *JAMA Netw Open*. 2019;2(5):e193667.
5. Davis MB, Walsh MN. Cardio-obstetrics. *Circ Cardiovasc Qual Outcomes*. 2019;12(2):e005417.
6. Silversides CK, Grewal J, Mason J, Sermer M, Kiess M, Rychel V, et al. Pregnancy outcomes in women with heart disease: the CARPREG II study. *J Am Coll Cardiol*. 2018;71(21):2419–30.
7. Stout KK, Daniels CJ, Aboulhosn JA, et al. 2018 AHA/ACC Guideline for the Management of Adults With Congenital Heart Disease: Executive summary: a report of the American College of Cardiology/American Heart Association task force on clinical practice guidelines. *Circulation*. 2019;139(14):e637–97.
8. Brown HL, Warner JJ, Gianos E, Gulati M, Hill AJ, Hollier LM, et al. Promoting risk identification and reduction of cardiovascular disease in women through collaboration with obstetricians and gynecologists: a presidential advisory from the American Heart Association and the American College of Obstetricians and Gynecologists. *Circulation*. 2018;137(24):e843–52.
9. Grodzinsky A, Florio K, Spertus JA, Daming T, Schmidt L, Lee J, et al. Maternal mortality in the United States and the HOPE Registry. *Curr Treatment Options Cardiovasc Med*. 2019;21(9):42.

## Publisher's Note

---

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.