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Importance of Engaging Obstetrician/Gynecologists in Cardiovascular Disease Prevention

Deborah B. Ehrenthal, MD, MPH^{1,2} and Janet M. Catov, PhD, MS³

¹Christiana Care Health System, Departments of Internal Medicine and OB/GYN, Newark, DE

²Thomas Jefferson University, Departments of Internal Medicine and OB/GYN, Philadelphia, PA

³University of Pittsburgh, Departments of OB/GYN and Epidemiology, Pittsburgh PA

Abstract

Purpose of the review—To review recent evidence regarding traditional and sex-specific factors identified among women during their reproductive years and their importance in lifetime risk for cardiovascular disease (CVD).

Recent findings—Longitudinal studies demonstrated a woman's burden of risk during her reproductive years is associated with future risk of CVD. Similarly, women with a healthy lifestyle are relatively protected and have the lowest lifetime risk. Some primary prevention strategies, when implemented during this age window, were cost-effective. The link between pregnancy outcome and future CVD risk is now better understood, and evidence now relates pregnancy-associated hypertension and, diabetes, as well as a preterm delivery or a low birth weight delivery, to excess risk. Gaps in preventive health care for women in this age group included low rates of treatment initiation for hypertension and failure to follow guidelines for diabetes surveillance among women with a history of gestational diabetes. Knowledge gaps for standard CVD prevention, as well as the link between pregnancy complications and future CVD risk, were identified among both primary care providers and obstetrician/gynecologists.

Summary—Traditional and sex-specific risk factors for CVD present during women's reproductive years. Engaging the obstetrician/gynecologist provides a strategy to enhance prevention.

Keywords

Cardiovascular prevention; adverse pregnancy outcomes; health care delivery

INTRODUCTION

Cardiovascular disease (CVD) remains the leading cause of death in the US and worldwide for both women and men. Current trends show decreased CVD mortality rates in the US,

Corresponding Author: Deborah B. Ehrenthal, MD, MPH, Department of Obstetrics and Gynecology, Christiana Care Health Services, 4755 Oglethorpe-Stanton Road, Newark, DE 19718, Phone: (302) 733-3966, Fax: (302) 733-1422, Dehrenthal@Christianacare.org.

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improvements attributed to sustained efforts to encourage smoking cessation, control CVD risk factors such as hypertension, and to improved acute care.(1, 2) An estimation of an individual's future risk for cardiovascular disease is used to guide clinical recommendations for primary and secondary prevention. However, prediction models are best at assessing risk at mid-life, a time when 10-year risk for a CVD event is measurable. The concept of ideal cardiovascular health across the life course, and the importance of accumulation of risk factors at younger ages, has emerged.(3) New approaches to improve early identification of high risk individuals are being sought to enable targeting of behavioral and medical interventions at a time when they might be most effective and have the greatest impact.

An emerging epidemiologic literature has identified a number of sex-specific diagnoses presenting during the reproductive years within subgroups of women who are at high risk for CVD later in life. These include polycystic ovary syndrome, infertility, and pregnancy complications (Table 1).(4–7) Typically identified by the obstetrician/gynecologist (OB/GYN), their recognition as harbingers of CVD risk allows clinicians to identify women for whom early intervention might impact their long term outcomes. These observations were incorporated into the 2011 updated American Heart Association (AHA) guidelines for the prevention of CVD in women, which includes for the first time the history of gestational diabetes (GDM) and gestational hypertensive disorders as risk factors for cardiovascular disease.(8) Because a majority of women receive reproductive health care from OB/GYNs during their reproductive years, these contacts with health care system present a key opportunity for risk identification, evaluation, and engagement in prevention of CVD.(9)

METHODS

We conducted electronic searches of the peer-reviewed medical literature published during 2012 and 2013 using Medline to identify relevant studies, guidelines or policy statements. The search strategy included keywords such as women, cardiovascular disease, prevention, pregnancy, hypertension, diabetes, gestational diabetes, preeclampsia, gestational hypertension, polycystic ovary syndrome, lactation, health care delivery, and clinical guidelines. Articles were selected if they addressed the importance of CVD risk among reproductive-age women, sex-specific cardiovascular risk factors presenting during the reproductive years, or health care delivery for women. Publications prior to 2011 were included if they were judged to be unique and particularly relevant by both authors.

REVIEW OF RECENT PUBLICATIONS

When taken together, several streams of research, expert opinion, and policy papers published over the past year provide a rationale and vision for a new strategy towards primary and secondary prevention of CVD in women. We conceptualize the importance of this work using a life course framework, emphasizing the concept that high risk women can be identified during their reproductive years at a time when addressing modifiable factors might be most effective and have the greatest impact.

Cardiovascular risk over the life course

Ideal cardiovascular health throughout an individual's life course places them at low lifetime risk of CVD. (3) Unfortunately, few women fall into this protected group and the rising prevalence of obesity, diabetes and hypertension portends an increase in rates of CVD in the US and worldwide.(10) As a group, African American women are the racial group least likely to have an ideal risk factor profile, predicting continued disparities in outcomes.(10, 11)

This year the importance of primordial and primary prevention was emphasized by the AHA in their policy statement.(12) Arguing that most CVD is preventable, they recognized that the process of atherosclerosis begins during childhood and continues throughout the life course. The value of effective strategies to help women and men adopt and maintain healthy behaviors was supported by cost-effectiveness analyses. They cited, for example, a systematic review estimating \$3 saved for every \$1 invested in smoking cessation programs during pregnancy. In addition, they reviewed the evidence supporting the cost-effectiveness of blood pressure and lipid screening as well as screening for diabetes among high risk populations.(12)

Liu et al examined the presence of "healthy lifestyle factors", among young adult participants in the prospective CARDIA study, and later associations with CVD risk factors. (13) They considered overweight or obesity, alcohol intake, level of physical activity, diet, and tobacco use when the participants were in their mid-20's and observed a strong, graded association between maintenance of healthy lifestyle from young adulthood and a low CVD risk profile (comprised of blood pressure, blood glucose and fasting lipid levels) in middle age.(13)

The importance of lifetime risk of cardiovascular disease across the age spectrum was again illustrated in a meta-analysis conducted by Berry et al using prospective cohort data for US populations.(14) They considered the presence of an elevated blood pressure, diabetes, elevated serum cholesterol, and tobacco use. Women whose risk factors were optimal at age 45 were relatively protected, and had a low lifetime risk of any event related to atherosclerotic CVD (Figure). Conversely, women with CVD risks factors were significantly more likely to have a fatal or non-fatal CVD event during their lifetime. (14)

Traditional CVD risk among reproductive age women

Unfortunately, the rise in the prevalence of obesity among young adults is associated with an increase in hypertension and diabetes presenting during the childbearing years. Bateman and colleagues used data from the National Health and Nutrition Examination Survey (NHANES) to provide estimates of the prevalence of hypertension and other CVD risk factors among US women age 20–44. (Table 2) They found nearly 8% of women had hypertension, and among African American women rates were 16.6%. The prevalence increased with age and BMI: 19% of women with a BMI of 35 kg/m² or more had hypertension.(15)

Huffman et al used 1988–2008 NHANES data to explore temporal trends in healthy behaviors (smoking, diet, physical activity and obesity) and physiologic risks (measures of

glucose, cholesterol and blood pressure) for CVD. (16) Among women between the ages of 20 and 39 there was a reduction in smoking, increased healthy diet scores, and greater leisure time physical activity reported. On the other hand, there were concerning increases in BMI and fasting blood glucose. (16) These data provided little assurance that the overall risk factor profiles of women and men in the US have improved, and reinforced the importance of a focus on screening and prevention in this age group.

Sex-specific CVD risk factors presenting during the reproductive years

Recent evidence has expanded our understanding of how common pregnancy complications—preeclampsia, fetal growth restriction, preterm delivery and GDM—may mark women at excess risk for CVD. In a general population, Bonamy et al have reported that among 923,686 Swedish women with singleton first births those delivered preterm (<37 completed weeks' gestation) or small for gestational age (SGA) had excess CVD hospitalizations or deaths in the years after pregnancy.(17) These associations were independent of socioeconomic factors, smoking and pregnancy-related hypertension, and were detected in a population with universal access to health care. Similar results were found in another cohort of 750,350 women in the U.K.(18) The well-established evidence linking preeclampsia to maternal CVD risk has now also been demonstrated in a study of 1,132,064 pregnancies to Asian women in Taiwan.(19) Women with early preeclampsia (delivered <32 weeks) were two times as likely to have hypertension 10 years after delivery compared to those with normotensive pregnancies, they had higher BMI and waist circumferences (20) and also had excess risk of subsequent diabetes mellitus.(21) Even hypertension in pregnancy at term has been associated with excess hypertension and metabolic syndrome as soon as 2.5 years after delivery.(22) Mechanisms that link reproductive events and later life CVD are not well understood, however recent evidence suggests that elevated blood pressure, metabolic syndrome, and perhaps inflammation may be involved. (23–25) New evidence also indicates that at least a portion of the risk associated with these factors is present prior to pregnancy, suggesting some common predisposing factors to pregnancy complications and later life CVD.(26) In addition, recent evidence indicates that lactation is associated with a healthy vascular profile in the decade after pregnancy.(27)

The well-established link between GDM and later CVD has now been expanded to more subtle abnormalities in glucose metabolism in pregnancy. In a prospective cohort of women with glucose tolerance testing during pregnancy, those without GDM but with impaired glucose tolerance had a more atherogenic lipid profile (higher LDL-c, higher total to HDL-cholesterol ratio; and higher apolipoprotein-B) after pregnancy compared to those with normal glucose tolerance.(28)

The recent work by Fraser et al utilizing the Avon Longitudinal Study of Parents and Children cohort synthesized many of these findings by relating pregnancy complications to CVD risk factors and their impact on the Framingham 10-year risk score.(29) Results indicated that both preeclampsia and GDM were associated with modest but significant increases in calculated CVD risk 18 years after pregnancy compared to women without these complications.

Since the Institute of Medicine revised the guidelines for gestational weight gain (GWG) in 2009 there has been heightened interest in how GWG may impact postpartum weight retention and contribute to the alarming trend of increasing adiposity among women of childbearing age.(30) A recent meta-analysis indicated that excessive GWG (compared to adequate GWG) was associated with higher weight retention after pregnancy of about 5 kilograms up to 15 years after pregnancy.(31) Excessive GWG is common, and has also been associated with higher blood pressure and accumulation of central adiposity 16 years after pregnancy marking both an important and modifiable attribute of pregnancy related to later life CVD risk in women.(30, 32)

Outside of pregnancy, there are factors that affect women uniquely or differently than men. The best studied is polycystic ovary syndrome (PCOS), a leading cause of infertility, characterized by hyperandrogenism and high rates of metabolic syndrome. Recent work has identified subgroups with PCOS with differing levels of insulin resistance and metabolic syndrome, ranging from 38–80%.(33) Thus, certain PCOS phenotypes are more severely metabolically affected and may warrant early and more intensive intervention. In addition, women with 5 years of subfertility who ultimately have a birth were a 20% more likely to have CVD later in life even after accounting for pregnancy complications.(34)

Missed opportunities for preventive health care

Women's health care has been called a "patchwork quilt with gaps". (35, 36) Today, women's preventive health care remains divided across the specialty fields of primary care and OB/GYN. The investigation by Lewis et al, using data from the National Health Interview Survey, found 15% of women between the ages of 18 and 64 were seen by general medical physicians, 62% by gynecologists alone, and 23% by both.(9) Though it was clear that providers in the two fields were focused on women's health, there were differing priorities leading to differential attention to prevention guidelines. Women who saw OB/GYNs received more preventive services and counseling than those who was general medical physicians alone. However, they were unable to assess blood pressure and lipid screening in their study.

The study published last year by Schmittdeil et al was able to examine treatment for hypertension and provides important insights into the effectiveness of this hybrid system of health care.(37) These investigators used clinical records to examine the health care received by women under 50 years of age who were enrolled in one of two health plans with 3.6 million members and had a new diagnosis of hypertension. Among this group of women, hypertension had been recognized in less than one third during the course of their health care. A hypertension diagnosis was half as likely if a woman was being seen in an OB/GYN clinic when compared to women whose elevated blood pressure was measured at a medicine clinic.(37) Another examination of preventive health services received by women was conducted in a rural setting by Kraschnewski et al.(38) They found women who were overweight or obese were more likely to receive counseling for healthy behaviors and CVD risk factors than women with a healthy weight. However, even among women in this high risk group, receipt of counseling around nutrition, physical activity, weight management as

well as lipid screening during the 2 year follow-up period were each reported by <70% of the sample.(38)

What is the scope of care provided by OB/GYNs? A national survey study of OB/GYNs conducted to better understand their approach to preventive care found a majority (61%) went beyond reproductive care when providing well-woman care, however they were unlikely to manage hypertension or elevated cholesterol.(39) A focus group study of OB/GYNs, working in academic and community settings, found most agreed that their role in prevention extended beyond reproductive care. However, there was variation in practice reported among the participants. They identified knowledge and skill deficits, concerns about liability, and barriers to prevention presented by their practice structure. Importantly, some providers emphasized difficulties completing referrals to primary care providers.(40)

Division of health care between the two provider types might play a role in poor follow-up care received by women after a pregnancy complicated by GDM.(41) This year Hunsberger et al reported the results of a survey of OB/GYNs and primary care providers across the state of Oregon. (42) When asked about their practices in follow-up care of women after GDM, OB/GYNs were more likely to recommend follow-up testing for diabetes during the postpartum period and to counsel women about their increased risk for type 2 diabetes, than family medicine physicians. There was evidence suggesting that provider knowledge, attitudes and beliefs about the link between GDM and future diabetes risk influenced testing practices. Similarly, Young et al assessed OB/GYN and primary care provider practice.(43) They found while nearly all primary care providers reported screening for CVD risk, fewer (70%) of OB/GYNs screened routinely. There was limited knowledge across both provider groups about the link between preeclampsia and future CVD risk, and significant gaps in preventive counseling of women with a history of preeclampsia. In Germany, where there are guidelines for follow-up care after a pregnancy complicated by preeclampsia, respondents reported greater knowledge about future CVD risk.(44)

A teachable moment

It has been suggested that pregnancy and new motherhood provide a teachable moment, when motivation for behavior changes is enhanced. An important paper published this year provided evidence in support of this concept. Rattan and colleagues reported the results of a longitudinal cohort study of 2992 women who had smoked tobacco daily before pregnancy and were followed for 21 years. (45) Though there were high relapse rates immediately following delivery, they found women who had quit smoking during pregnancy had rates of smoking cessation in subsequent years which were 2–4 times higher than those of women who continued to smoke during their pregnancy. The authors conducted careful adjustment for individual factors potentially confounding this association, including socioeconomic, demographic and other behavioral factors. They concluded that pregnancy provides a key opportunity to positively influence CVD risk factors.(45)

CONCLUSION

Research published over the past year provides new insights into the importance of addressing modifiable risk factors for CVD during women's childbearing years. It is now

clear that pregnancy provides an opportunity to identify women who have a high lifetime risk for CVD. Both traditional and sex-specific risk factors are often identified by the OB/GYN provider during their course of reproductive care. Though the OB/GYN may consider CVD prevention outside of their scope of practice, they are in a key position to recognize women who are at high risk for future CVD. Engaging OB/GYN in CVD prevention will enable earlier intervention and provide a new avenue to engaging women in primary and secondary prevention.

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Abbreviations

AHA	American Heart Association
BMI	Body mass index
CVD	Cardiovascular disease
GDM	Gestational diabetes mellitus
GWG	Gestational weight gain
NHANES	National Health and Nutrition Examination Survey
OBGYN	obstetrician/gynecologist
PCOS	Polycystic ovary syndrome
SGA	Small for gestational age

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Key points

1. Cardiovascular risk factors identified during the reproductive years are strongly related to future risk of cardiovascular disease.
2. Sex-specific risk factors, often identified by the obstetrician/gynecologist, provide early identification of women at high risk for cardiovascular disease.
3. The hybrid system of health care for women leads to gaps in care which impact lifetime risk of cardiovascular disease.
4. Engaging OB/GYN providers in cardiovascular disease prevention may provide a new path to engaging women in primary and secondary prevention.

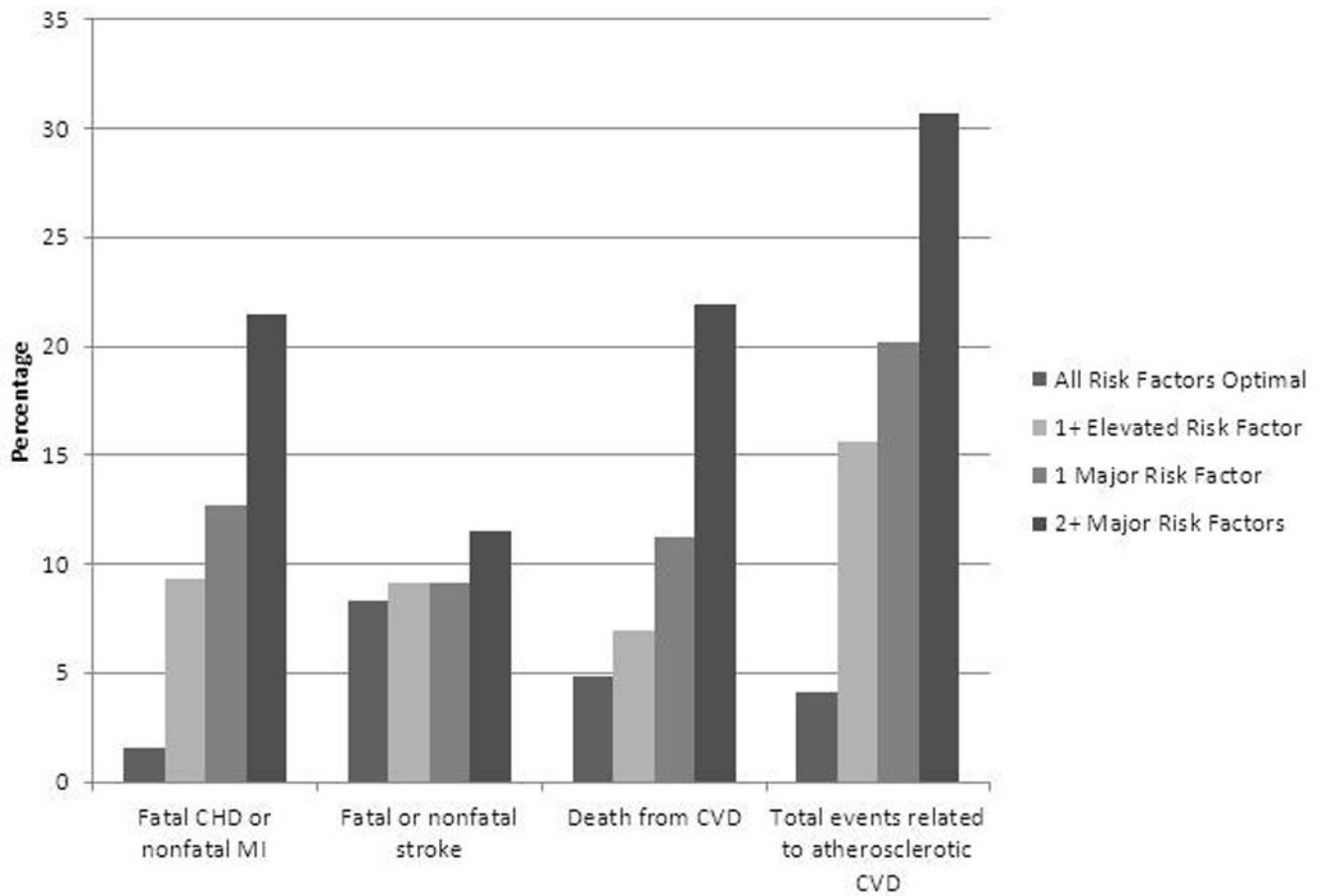


Figure.
 Heading: Lifetime risks of cardiovascular events among women based on risk factor burden at 45 years of age.
 Source: Data adapted from Berry et al. (14)

Table 1

Cardiovascular Risk Factors During Women's Reproductive Years

Traditional Risks	Smoking
	Diabetes
	Blood pressure/hypertension
	Dyslipidemia
Reproductive Risks	Polycystic ovary syndrome
	Infertility
	Adverse pregnancy outcomes (preterm delivery, hypertensive disorders, gestational diabetes)
Other Behavioral Risks	Physical activity
	Diet
	Obesity
	Lactation

Table 2

Prevalence of CVD Risk Factors Among Women of Reproductive Age, 20–44, 1999–2008*

	% (95% CI)
Diabetes	2.4 (2.0–2.9)
Hypertension	7.7 (6.9–8.5)
BMI category (kg/m ²)	
<25	42.4 (40.3–44.5)
25–<30	25.9 (24.3–27.7)
30–<35	16.2 (15.0–17.6)
≥35	15.5 (14.1–17.0)
Tobacco use	25.4 (23.6–27.2)
Chronic kidney disease	2.9 (2.4–3.5)

* Weighted estimates from NHANES, adapted from Bateman et al. (15)