OBSTETRICS

The maternal health clinic: an initiative for cardiovascular risk identification in women with pregnancy-related complications

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OBJECTIVE: Women who develop certain common pregnancy complications have a greater chance of developing cardiovascular disease (CVD) later in life. However, most health care providers do not provide postpartum cardiovascular risk counselling or follow-up. The Maternal Health Clinic was established to address this gap in care. It targets women at increased risk of CVD to inspire lifestyle changes, encourage long-term follow-up, and initiate primary prevention. Here, we summarize results from the first 17 months of completed clinic visits.

STUDY DESIGN: Patients experiencing at least one relevant complication in their index pregnancy were referred to the Maternal Health Clinic through standard postpartum order sheets. Patients underwent a complete assessment including screening history, physical examination, fasting bloodwork, and urinalysis. Lifetime and 30-year CVD risk estimates, along with a metabolic syndrome calculation, were determined for each patient.

RESULTS: Complications most commonly leading to referral were gestational diabetes or impaired glucose tolerance (32.7%), preeclampsia (29.3%), preterm birth (29.3%), and gestational hypertension (19.6%). The clinic analysis group (n = 92) was compared with a healthy control group from the PreEclampsia New Emerging Team study (n = 118). Patients in the clinic analysis group had significantly increased lifetime and 30-year CVD risk estimates compared with healthy controls ($P < .0001$). Furthermore, 17.4% of the clinic analysis group had metabolic syndrome, compared with 6.78% of healthy controls ($P < .05$).

CONCLUSION: This study demonstrates that the Maternal Health Clinic accurately identifies postpartum patients that have underlying cardiovascular risks which make them susceptible to CVD. The clinic may serve as an effective primary prevention strategy.

Key words: cardiovascular diseases, maternal health clinic, pregnancy, pregnancy complications, risk factor

Cite this article as: Cusimano MC, Pudwell J, Roddy M, et al. The Maternal Health Clinic: an initiative for cardiovascular risk identification in women with pregnancy-related complications. Am J Obstet Gynecol 2014;210:438.e1-9.

Cardiovascular disease (CVD) is the leading cause of death in women worldwide.[1] Despite greater awareness of this issue, mortality because of coronary heart disease in women aged 35 to 54 years is increasing.[2] This trend underscores the need for earlier recognition of those at risk and implementation of primary prevention strategies.

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Received July 19, 2013; revised Oct. 28, 2013; accepted Dec. 1, 2013.

This work was supported by the Allied Health Science Centres Alternate Funding Plan Innovative Fund.

The authors report no conflict of interest.

Reprints not available from the authors.

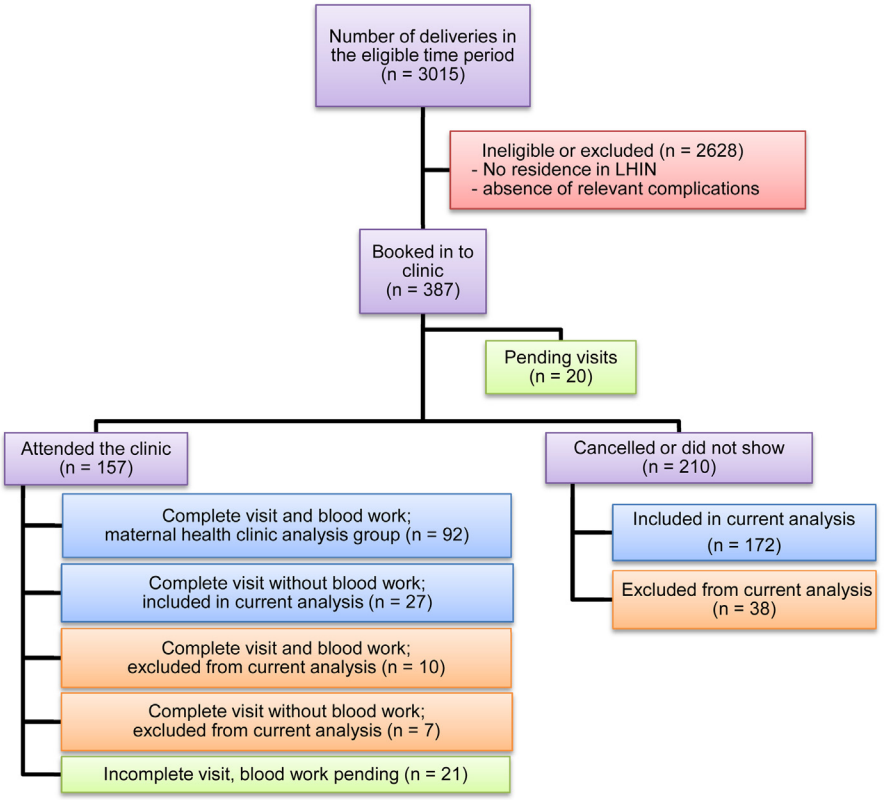
0002-9378/$36.00

http://dx.doi.org/10.1016/j.ajog.2013.12.001

Pregnancy is a physiologic stress test that identifies women at risk of future CVD.[3] Large epidemiologic and cohort studies have demonstrated that patients who develop certain pregnancy complications have an elevated risk of CVD and CVD-related mortality.[4-10] For instance, index pregnancies complicated either by hypertensive disorders, gestational diabetes, intrauterine growth restriction, or preterm delivery have been associated with a 50-300% increased risk of CVD.[5] Furthermore, in women who experience multiple complications within a single pregnancy or have concomitant traditional risk factors such as obesity or dyslipidemia, the risk of CVD is further amplified.[5,6,7,9] The obstetric history may therefore act as a more sensitive screening tool for CVD risk than traditional prediction models, such as the Framingham risk score, which rarely recognizes young women at risk.[11]

Taken together, these studies suggest that pregnancy complications can identify high-risk women early enough to implement primary preventative strategies.[4,12-14] However, few health care providers carry out postpartum CVD risk counseling[15] and data on risk modification initiatives for this population is lacking. In a recent issue of *Hypertension*, Spaan et al[16] propose the implementation of a structured postpartum cardiovascular screening program for women who have experienced a hypertensive disorder of pregnancy, citing the postpartum period as a time when women are motivated to modify their lifestyle. The Maternal Health Clinic[17] at Kingston General Hospital (KGH), Queen's University, follows many aspects of the suggested framework. To our knowledge, this is the first initiative of its kind in North America. The clinic aims to see women who have experienced a pregnancy-related cardiovascular risk (CVR) indicator in order to discuss their increased risk of CVD, identify comorbidities, encourage lifestyle changes, and ultimately ensure

FIGURE
Flow sheet of clinic screening, booking, and attendance for all scheduled clinic visits until April 30, 2013



Women were excluded from the current analysis if they did not experience one or more of the listed relevant complications in their index (last) pregnancy.

LHIN, Local Health Integration Network.

Cusimano. Postpartum maternal health clinic. Am J Obstet Gynecol 2014.

long-term follow-up and/or specialist referral. Our clinic methodology has been described in detail in a previous article,[17] thus will only be briefly summarized in this report. In support of what was proposed in *Hypertension*,[16] the objective of this article is to present the results of the first 17 months of completed visits at the Maternal Health Clinic.

Materials and Methods

Subjects

To be eligible for referral to the Maternal Health Clinic, patients had to experience one or more of the following pregnancy-related CVR indicators in their index pregnancy: gestational hypertension (GH), preeclampsia (PE), gestational diabetes (GDM),[28] gestational impaired glucose tolerance (GIGT),[28] idiopathic preterm birth, placental abruption, or intrauterine fetal growth restriction (IUGR). Women who had traditional CVD risk factors such as chronic pre-pregnancy hypertension or diabetes were eligible for referral to Maternal Health Clinic only if they experienced 1 of the relevant pregnancy complications. Diagnoses were validated by a research assistant through review of prenatal records. Patients were excluded if they lived outside of our local health integration network. All scheduled clinic visits from Nov. 2011 to March 2013 were considered in this analysis. Blood and urinalysis results received by April 30, 2013, were included. The Research Ethics Board at Queen's University approved the study and all patients gave informed consent before participation.

Method

The Maternal Health Clinic has been adopted as standard of care in the Department of Obstetrics and Gynecology at KGH. All patients who deliver at KGH are considered for referral. At the time of discharge from hospital, those eligible are automatically referred through the use of standard postpartum order sheets.[17] Patients are seen in the Maternal Health Clinic at 6 months postpartum, where they undergo a history and physical examination and are subsequently sent for fasting glucose, lipid profile, and urinalysis including microalbumin and creatinine. If a patient experienced GDM or GIGT, they are also asked to complete a 2-hour oral glucose tolerance test. Blood pressure measurements are obtained as previously described.[4] Patients also meet with the obstetrician to discuss their pregnancy complication, its relation to CVD, and suggested lifestyle modifications to facilitate CVR reduction. A follow-up letter and clinical data collection form is sent to both the patient and her family doctor, and further consults to endocrinology, cardiology, and nephrology are made based on the patient's individual profile.

Patients scheduled for a visit during our analysis period of Nov. 2011 to March 2013 delivered at KGH approximately 6 months prior, between May 2011 and Sept. 2012. Over that interval, 3015 women delivered at KGH and were screened for eligibility (Figure). Of these, 387 were invited to clinic based on inclusion/exclusion criteria, and 157 (40.6%) attended the clinic. At the time of analysis, 102 were considered as they had undergone a full assessment, which included their clinic visit and having completed fasting blood work and urinalysis. However, data are presented for 92 women. Ten women with complete visits and blood work were omitted because their reason for clinic referral was excess weight gain during their index pregnancy. This was originally considered in the inclusion criteria for referral to the Maternal Health Clinic but has since been removed. Data from these women was therefore omitted such that our analysis reflects the current