Understanding Pregnancy-Related Cardiovascular Risks

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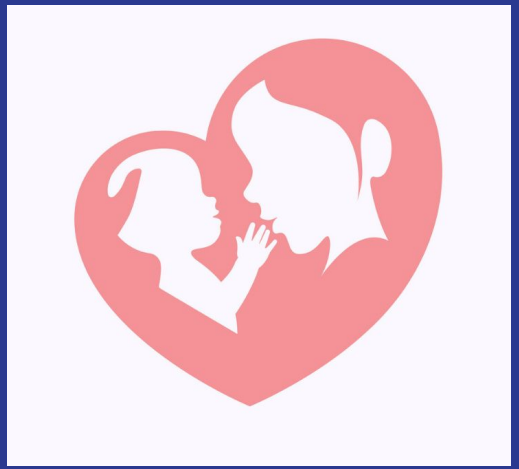
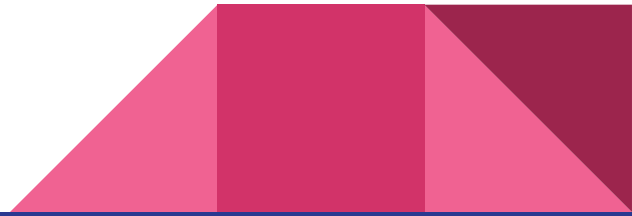


Disclosures

I am working with a local interdisciplinary group to bring these concepts to practice in Victoria and this work is currently being funded by Shared Care.

Goals for Today:

1) Identify pregnancy as a cardiovascular stress test
2) List the pregnancy-related CV risk factors
3) Understand the implications for women's future CV risk
4) Outline relevant practice recommendations & resources



Pregnancy is women's first CV stress test:

- Cardiovascular changes:
  - **increased cardiac output** (both increased HR and SV)
  - expanded blood volume and associated **dilutional anemia**
  - **reduced** systemic vascular resistance and **blood pressure**
  - enhanced **utero-placental circulation**
  - all in order to optimize fetal growth
- Increase in **systemic cortisol** driven by progesterone -> increase in **insulin resistance**

We uncover CV risk factors in prenatal care:

Traditional Atherosclerotic Risk Factors:

- Smoking
- Chronic hypertension
- Diabetes
- Elevated BMI
- Sleep apnea (moderate to severe)

Pregnancy-Related CV Risk Factors:

- **Hypertensive disorders of pregnancy (HDP): preeclampsia, gestational hypertension, HELLP**
- Gestational diabetes
- Delivery of a preterm infant (<37 weeks)
- Intrauterine growth restriction (<5th %ile)
- Stillbirth
- Clinically significant placental abruption (delivery or adverse outcome)
- *Excessive weight gain in pregnancy**

20% of pregnant women have one of more of these risk factors
30% of women with traditional risk factor develop pregnancy-related risk factor

Pregnancy-Related CV risk factors:

“A failed stress test”

“unmasking early or preexisting endothelial dysfunction and vascular or metabolic disease”

“The metabolic syndrome of pregnancy”

According to the AHA 2011 Guidelines for the Prevention of CVD in Women

How do these affect CV risk?

HYPERTENSIVE DISORDERS*

2 X the risk of stroke
2.5 X the risk of coronary artery disease
4 X the risk of developing hypertension

*Gestational hypertension, preeclampsia, eclampsia, HELLP

INTRAUTERINE GROWTH RESTRICTION

33% ↑ in maternal cardiovascular mortality associated with every approximately 500g ↓ in infant birth weight

PLACENTAL ABRUPTION

Almost 2 X risk of future cardiovascular disease

IDIOPATHIC PRETERM DELIVERY

Associated with a 38% ↑ risk of ischemic heart disease and 71% ↑ risk of stroke

GESTATIONAL DIABETES

More than 7 X risk of developing type 2 diabetes mellitus

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https://www.themothersprogram.ca/for-care-providers/the-maternal-health-clinic

Women with hypertensive disorders of pregnancy have:

- 3-4x increased risk of chronic hypertension
- 4.2x increased risk of heart failure
- 2x increased risk of stroke
- 5-12x increased risk of end-stage renal disease
- 2x risk atrial arrhythmia
- 2x risk coronary disease
- **2x overall mortality**

Compared to women with normotensive pregnancies

Is this an opportunity for primary prevention?

Review of the Literature

- The American College of Obstetricians and Gynecologists (ACOG) now formally recommends CV risk screening at 3 months postpartum for women with one or more pregnancy-related CV risk factors (1).
- Groups in Kingston, ON (3), Northern BC (4), Edmonton, AB (5), and Boston, Mass (6), have developed specialist clinics these to address postpartum CV risk management.
- Focus group (Ontario): surveyed primary care providers about postpartum CV risk management: “feel they should be in charge of CV disease prevention and management and that including obstetrical outcomes in standard CV risk stratification tools would be helpful for them to do so (7).

ACOG's recommendation

CV risk screening at 3 months postpartum for women with any of:

- Hypertension/HELLP
- Gestational diabetes
- IUGR
- Preterm delivery
- Abruption
- Excessive weight gain
- Sleep apnea (at least moderate)
- Age over 40

Box 4. Postpartum Cardiovascular Risk Screening

Medical history

- Smoking (number of cigarettes per day, number of years smoked)
- Physical activity (times per week, duration)
- Breast feeding (how long)
- History of hypertension, diabetes, or cardiovascular disease
- First degree family history of cardiovascular disease, hypertension, or diabetes

Physical examination

- Resting blood pressure and heart rate
- Body mass index and waist circumference

Biochemical testing

- Cholesterol/lipid profile HDL, LDL, Trigs
- Fasting glucose (or oral glucose tolerance testing if patient had gestational diabetes)
- Urine protein assessment (protein:creatinine ratio)

Nutrition assessment & Contraception

What you can do:

- These recommendations are based on ACOG guideline (2019), other Canadian programs, local expertise
- There is a Canadian Best Practice Statement due on this very soon!

Consider a 3-6 month postpartum visit for patients with CV risk factors:

- Hx
- Px
- Labs
- Risk stratification and patient education around their individual risk
- Lifestyle and medical management of risk factors

Hypertension

- Close monitoring in the short-term postpartum for severe hypertension and wean medication as able
- Accurate diagnostic methods: 24h ambulatory BP, automated office BP, home BP
- Lifestyle management
- Lactation-appropriate management: labetalol, nifedipine, enalapril
- **Work-up for secondary causes if persistent postpartum HTN (>6 weeks) or diagnosed <20 wks**, consider referral to IM

Dyslipidemia

- Screening lipid panel regardless of BF status with consideration to repeat in 6 months if elevated while breastfeeding
- Diet and lifestyle management
- AHA 2019: HDP put women in “intermediate risk” category for consideration of statin therapy
- Per 2021 CCS guideline: individualize lifetime risk assessment (i.e .CV age) to guide therapy
- CCS recommends hydrophilic statins (pravastatin and rosuvastatin) for less passage across a potential placenta, use with contraceptive and stop when desiring pregnancy

Dysglycemia

- If prior GDM, 75g OGTT preferred for diagnostic accuracy at 6 weeks to 6 mo PP
- If no prior GDM, can screen with HbA1c
- Lifestyle management +/-medication

Renal disease

- If AKI or HDP, assess renal function and screen for proteinuria annually (GFR, ACR/PCR and UA), if +ACR then do 24h urine protein
- Recognize proteinuria can persist up to 2 years postpartum
- Consider involving internal medicine
- ACEi and ARB can be used outside of pregnancy, stop at conception with regular monitoring of renal function

Obesity

- BMI/ waist circumference measurement
- Diet & exercise hx
- Individualized goal setting

Lifestyle Management

- Smoking cessation counselling
- Address mental health (higher risk for PPD in anyone with one of the pregnancy related CV risk factors), exercise as a dual treatment
- Diet
- Exercise

Talking to my patient about this:

- The MotHERS program (Kingston ON)
- Vascular age: CIRCL at UBC
- CV age: My Health Checkup (McGill) (minimum age 30)

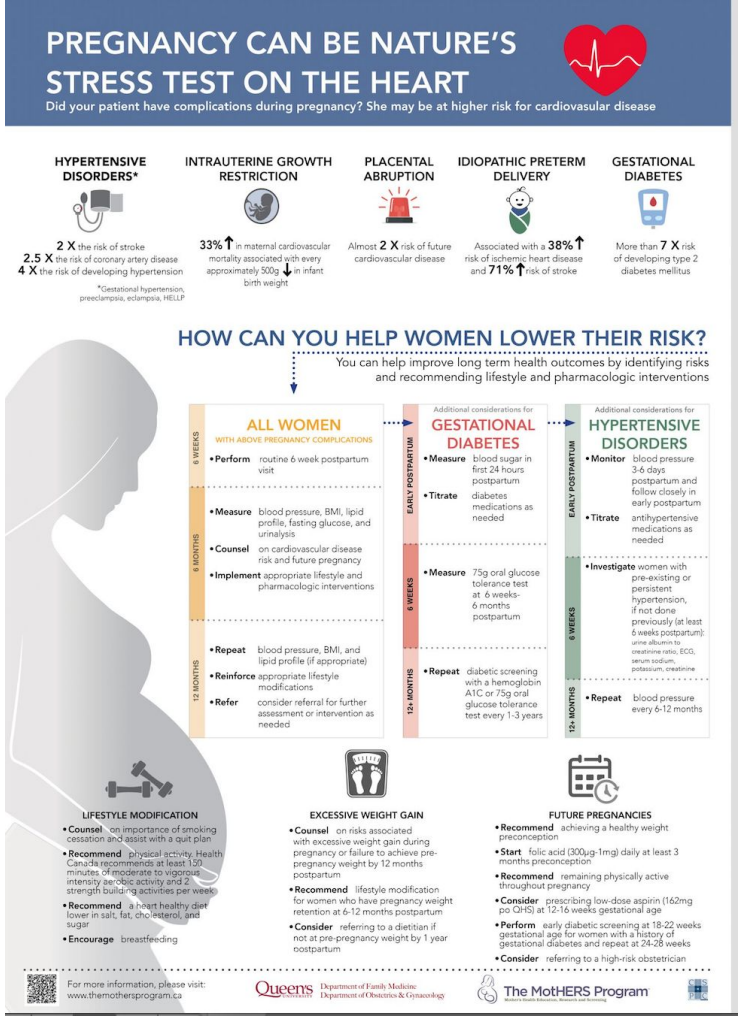
- Continue to re-evaluate this risk for your patient annually, or at an interval individualized to your patient especially if planning future pregnancies

Putting this Into Action!

- Consider outlining pregnancy-related risk factors in discharge letters to family physicians and recommend follow up
- When taking a CV history in post-menopausal women, ask about pregnancy-related risk factors
- In patients who come back to your care postpartum, ask about pregnancy-related risks factors

Resources

- Template discharge letter
- Template 6 month postpartum visit
- Summary of risk factors to address
- Kingston’s Mothers Program handouts



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HOW CAN YOU HELP WOMEN LOWER THEIR RISK?

You can help improve long term health outcomes by identifying risks and recommending lifestyle and pharmacologic interventions

ALL WOMEN

WITH ABOVE PREGNANCY COMPLICATIONS

6 WEEKS

- **Perform** routine 6 week postpartum visit

6 MONTHS

- **Measure** blood pressure, BMI, lipid profile, fasting glucose, and urinalysis
- **Counsel** on cardiovascular disease risk and future pregnancy
- **Implement** appropriate lifestyle and pharmacologic interventions

12 MONTHS

- **Repeat** blood pressure, BMI, and lipid profile (if appropriate)
- **Reinforce** appropriate lifestyle modifications
- **Refer** consider referral for further assessment or intervention as needed

Additional considerations for

GESTATIONAL DIABETES

EARLY POSTPARTUM

- **Measure** blood sugar in first 24 hours postpartum
- **Titrate** diabetes medications as needed

6 WEEKS

- **Measure** 75g oral glucose tolerance test at 6 weeks-6 months postpartum

12+ MONTHS

- **Repeat** diabetic screening with a hemoglobin A1C or 75g oral glucose tolerance test every 1-3 years

Additional considerations for

HYPERTENSIVE DISORDERS

EARLY POSTPARTUM

- **Monitor** blood pressure 3-6 days postpartum and follow closely in early postpartum
- **Titrate** antihypertensive medications as needed

6 WEEKS

- **Investigate** women with pre-existing or persistent hypertension, if not done previously (at least 6 weeks postpartum): urine albumin to creatinine ratio, ECG, serum sodium, potassium, creatinine

12+ MONTHS

- **Repeat** blood pressure every 6-12 months

LIFESTYLE MODIFICATION

- **Counsel** on importance of smoking cessation and assist with a quit plan
- **Recommend** physical activity. Health Canada recommends at least 150 minutes of moderate to vigorous intensity aerobic activity and 2 strength building activities per week
- **Recommend** a heart healthy diet lower in salt, fat, cholesterol, and sugar
- **Encourage** breastfeeding

EXCESSIVE WEIGHT GAIN

- **Counsel** on risks associated with excessive weight gain during pregnancy or failure to achieve pre-pregnancy weight by 12 months postpartum
- **Recommend** lifestyle modification for women who have pregnancy weight retention at 6-12 months postpartum
- **Consider** referring to a dietitian if not at pre-pregnancy weight by 1 year postpartum

FUTURE PREGNANCIES

- **Recommend** achieving a healthy weight preconception
- **Start** folic acid (300µg-1mg) daily at least 3 months preconception
- **Recommend** remaining physically active throughout pregnancy
- **Consider** prescribing low-dose aspirin (162mg po QHS) at 12-16 weeks gestational age
- **Perform** early diabetic screening at 18-22 weeks gestational age for women with a history of gestational diabetes and repeat at 24-28 weeks
- **Consider** referring to a high-risk obstetrician

What’s coming next in this area of research?

- Women-specific CV risk prediction tools
- Optimal timing for initiating/stopping lipid-lowering therapy wrt pregnancy
  - HSF national database of CV risk factors in pregnancy to guide these
- Heart-brain-placenta connection: HDP are associated with higher rates of PP anxiety and depression

References

1) ACOG practice bulletin no. 212 summary: Pregnancy and heart disease. (2019). Obstetrics & Gynecology, 133(5), 1067-1072. doi:10.1097/AOG.000000000000324

2) Mosca, L., Benjamin, E. J., Berra, K., Bezanson, J. L., Dolor, R. J., Lloyd-Jones, D. M., . . . American Heart Association. (2011). Effectiveness-based guidelines for the prevention of cardiovascular disease in women--2011 update: A guideline from the american heart association. Journal of the American College of Cardiology, 57(12), 1404-1423. doi:10.1016/j.jacc.2011.02.005

3) Smith, Graeme N., MD, PhD, FRCSC, Pudwell, J., MPH, & Roddy, Michelle, RN, BScN. (2013). The maternal health clinic: A new window of opportunity for early heart disease risk screening and intervention for women with pregnancy complications. Journal of Obstetrics and Gynaecology Canada (JOGC), 35(9), 831-839. doi:10.1016/S1701-2163(15)30841-0

4) North Coast Maternal Health Clinic. Unpublished report to the Specialist Services Committee. Presented to Society of Obstetricians and Gynaecologists, June 2018. Pienaar,M.

5) Celi, A. C., Seely, E. W., Wang, P., Thomas, A. M., & Wilkins-Haug, L. E. (2019). Caring for women after hypertensive pregnancies and beyond: Implementation and integration of a postpartum transition clinic. Maternal and Child Health Journal, , 1-8. doi:10.1007/s10995-019-02768-7

6) Foley, Michael. “Maternal adaptations to pregnancy: Cardiovascular and hemodynamic changes.” (2019). UptoDate.

7) https://www.themothersprogram.ca/for-care-providers/the-maternal-health-clinic

8) Canadian Diabetes Association. “Gestational Diabetes and Postpartum Screening.” (2013). Accessed from: https://www.diabetes.ca/DiabetesCanadaWebsite/media/Managing-My-Diabetes/Tools%20and%20Resources/gestational-diabetes-postpartum-screening.pdf?ext=.pdf

9) CardioRisk Calculator. CARDIOVASCULAR IMAGING RESEARCH CORE LABORATORY. 2019. Accessed from: https://www.circl.ubc.ca/cardiorisk_webportal.html

References (2)

10) My Health Checkup. McGill University. Accessed from: https://myhealthcheckup.com/cvd/?lang=en

11) Pearson, G. J., Thanassoulis, G., Anderson, T. J., Barry, A. R., Couture, P., Dayan, N., Francis, G. A., Genest, J., Grégoire, J., Grover, S. A., Gupta, M., Hegele, R. A., Lau, D., Leiter, L. A., Leung, A. A., Lonn, E., Mancini, G. B. J., Manjoo, P., McPherson, R., . . . Wray, W. (2021). 2021 canadian cardiovascular society guidelines for the management of dyslipidemia for the prevention of cardiovascular disease in the adult. *Canadian Journal of Cardiology,* https://doi.org/10.1016/j.cjca.2021.03.016

12) Hot Topics in Cardio-Obstetrics. Nerenberg, K. Canadian Women's Heart Health Summit. Feb 2021.

13) Coutinho T, Lamai O, Nerenberg K. Hypertensive disor- ders of pregnancy and cardiovascular diseases: current knowledge and future directions. Curr Treat Options Cardiovasc Med 2018;20:56. (Level III)

14) Cunningham MW Jr, LaMarca B. Risk of cardiovascular disease, end-stage renal disease, and stroke in postpartum women and their fetuses after a hypertensive pregnancy. Am J Physiol Regul Integr Comp Physiol 2018;315: R521–8. (Level III)

Questions