Robinson Research Institute
Healthy children for life.

Government of South Australia
SA Health

The Hospital Research Foundation Group

THE UNIVERSITY OF ADELAIDE
AUSTRALIA

COFFEE Clinic

Cardiovascular assessment after obstetric complications:

follow-up for education and evaluation

none

DISCLOSURES

Pregnancy is a metabolic and cardiovascular stress test

Complications of pregnancy are a marker of future CV risk

Pregnancy may be the first significant contact of the woman with the Healthcare system

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the problem doesn't "go away" after delivery

The over-arching hypothesis

Women with pregnancy complications

- Preeclampsia & Hypertension in pregnancy
- Gestational Diabetes Mellitus
- Small for Gestational Age infant
- Spontaneous preterm delivery

May occur as a result of Gene - environment interactions

- These may be identified by clinical and bio-markers during pregnancy
- Cardiometabolic risk factors for vascular and metabolic disease reappear in their post-partum life.

Women with these identifiable risk factors should be followed up for cardiovascular, metabolic and renal diseases in the long-term following the birth of their first baby.

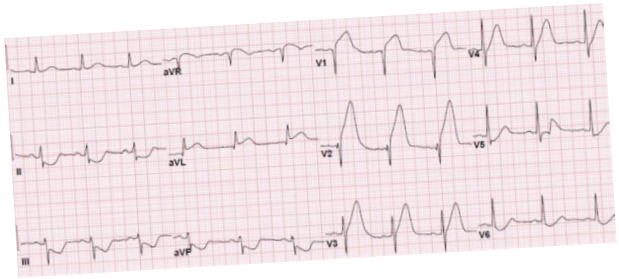
Early identification of cardiometabolic risk factors post-partum will allow targeted interventions to reduce future chronic disease burden

The journey to the coffee clinic

CARDIAC PERSPECTIVE

Two Adelaide hospital STEMI databases 2005 to 2010

- 912 consecutive ST Elevation AMI patients (26% women) undergoing immediate PCI
- Women had a worse haemodynamic response despite similar infarct size and territory
- ↑ 30-day mortality and re-infarction for women (7% vs 15%, p = 0.012)



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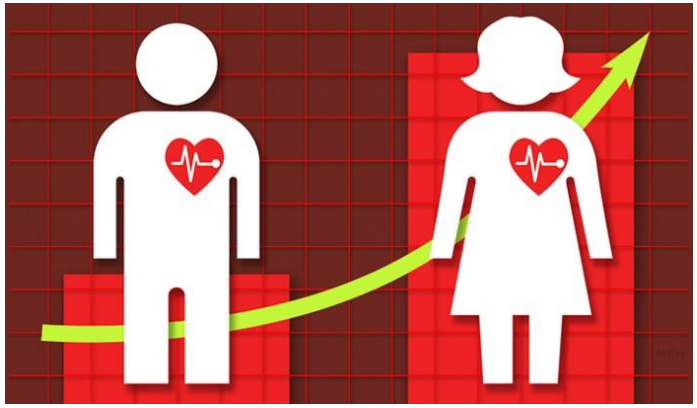
Dreyer R et al. Am J Cardiol 2013;112:143e149



- An international multi-centre study of 18-55 year old women and men with AMI 2008-2012

The VIRGO study

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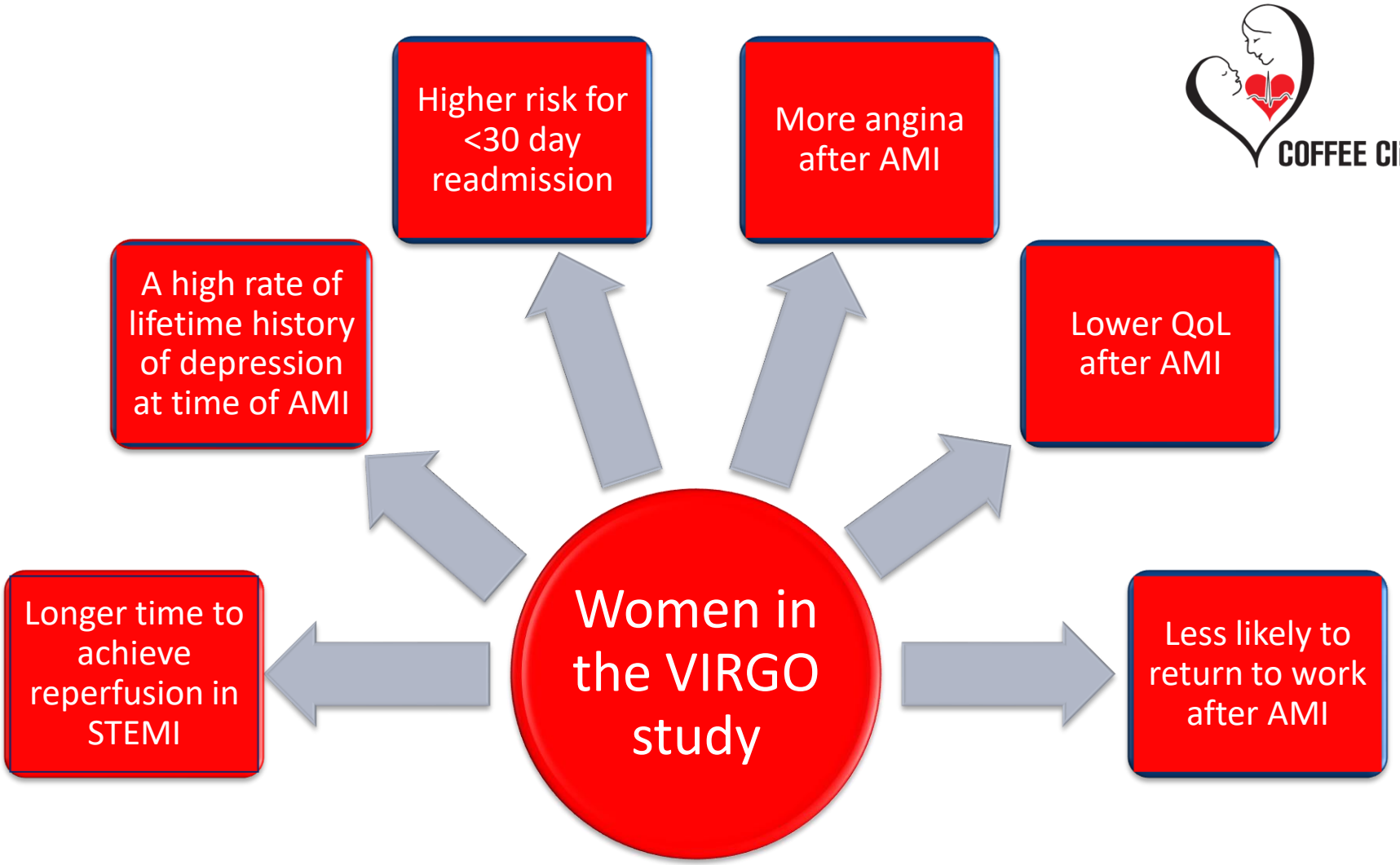
Important outcomes on gender differences from the Virgo study



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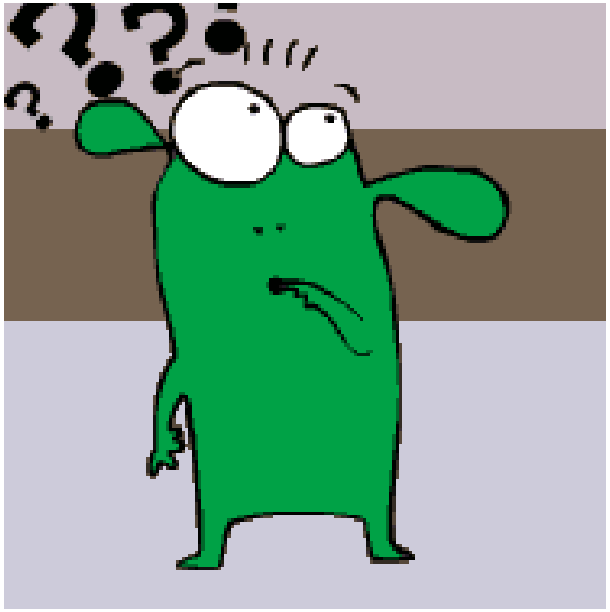

HOW CAN SUCH PREMATURE ACUTE MYOCARDIAL INFARCTION BE PREVENTED IN WOMEN?

The journey to the coffee clinic

THE OBSTETRIC PERSPECTIVE

SCreening f**O**r **P**regnancy **E**ndpoints (**SCOPE**)

- International, multi-centre, prospective cohort study 2005 - 2008
- 1164 mother-father-baby trios in Adelaide
  - 93 developed preeclampsia
  - 118 gestational hypertension
  - 95 normotensive mothers delivered SGA babies
  - 69 delivered preterm
  - 51 had gestational diabetes

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Principle investigators for Adelaide Cohort: Prof G Decker & Prof C Roberts

To identify a combination of clinical, family history and lifestyle factors, and genetic and biochemical biomarkers that predict the risk of these pregnancy complications at 15 weeks of gestation

SCOPE

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What was the Adelaide Experience?

	non-Case n (%)	Pre-eclampsia n (%)	Gestational Hypertension n (%)	Gestational Diabetes n (%)	Small for gestational age n (%)	Spontaneous preterm delivery n (%)	Total^
Adelaide*	765 (65.7)	93 (8.0) ⇧	118 (10.1)	51 (4.4) ⇧	141 (12.1)	69 (5.9) ⇧	1164
Auckland#	1574 (77.5)	85 (4.2)	114 (5.6)	38 (1.9)	201 (9.9)	87 (4.3)	2032
Cork@	1291 (72.8)	68 (3.8)	213 (12)	44 (2.5)	190 (10.7)	56 (3.2)	1774
UK%	484 (73.6)	32 (4.9)	25 (3.8)	10 (1.5)	101 (15.3)	24 (3.6)	658
Total	4114	278	470	143	633	236	5628

Population specific incidence of pregnancy complications in **SCOPE** (SCreening fOr Pregnancy Endpoints) women Recruited 2005-2008

Kenny LC et al. SCOPE study. Hypertension 2014; 64: 644

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What is different about the Adelaide women of SCOPE?

- ↓ socioeconomic status
  - Similar to Western Sydney & Western Melbourne
- ↑ BMI
  - >55% overweight or obese vs 38-40% in other cohorts
- ↑ continued smoking during pregnancy
  - 23% vs 4-11%

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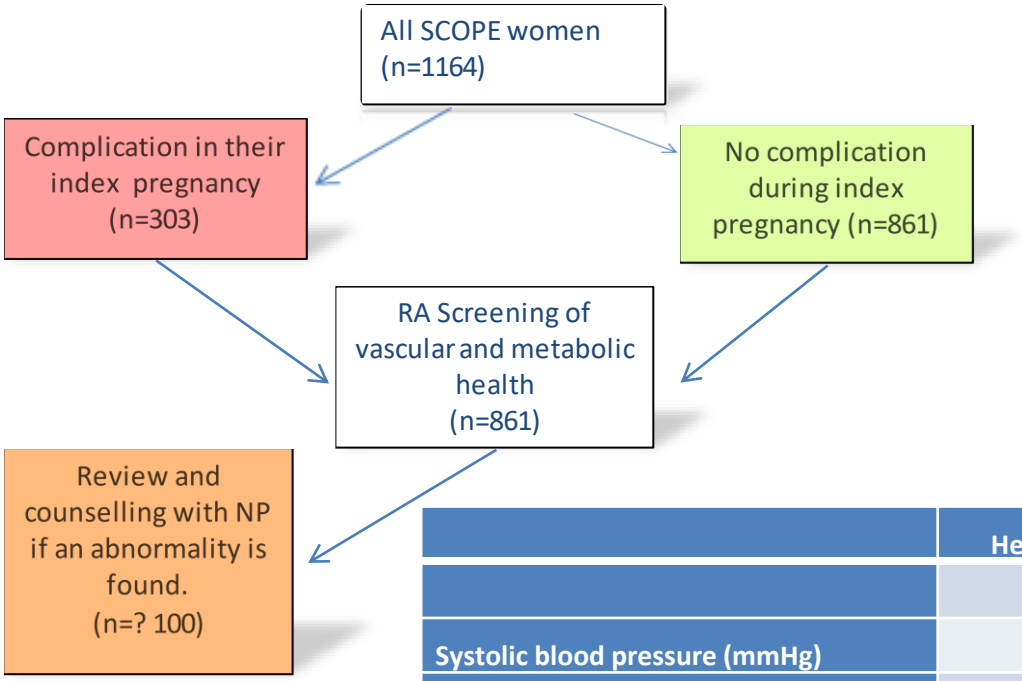
The journey to the COFFEE clinic

THE POST-PREGNANCY PERIOD

Scope follow-up at 10-12 years after pregnancy



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	Healthy control group*		Complicated pregnancy		P
	(n = 23)		(n = 61)		
Systolic blood pressure (mmHg)	100	± 13	108	± 12	0.008
Diastolic blood pressure (mmHg)	64	± 11	69	± 10	0.030
Central systolic blood pressure (mmHg)	103	± 12	111	± 15	0.020
Stroke Volume Index (ml/m2/beat)	44.3	± 10.4	37.8	± 10.2	0.010
Total cholesterol (mmol/l)	4.6	± 0.3	5.1	± 0.99	0.100
Triglycerides (mmol/l)	0.7	± 0.3	1.2	± 0.6	0.040
Fasting Insulin mU/l	6.4	± 2.8	13.1	± 7.9	0.020

* Women with a current BMI <25 who had uncomplicated pregnancy

Hypertension returns

- 2.5 years after pregnancy follow-up
  - Netherlands study
  - Hypertension in pregnancy (HIP), n = 306
  - Normotension in pregnancy (NIP), n=99
- Hypertension in pregnancy (HIP)predicted
  - ↑ hypertension (34% vs 1% if no HIP; p<0.001)
  - ↑ metabolic syndrome (25% vs 5% if no HIP; p<0.01)

Hermes W, Mol BW et al. Am J O&G. 2013;208:474.e 1-8

After 18 years follow-up…..

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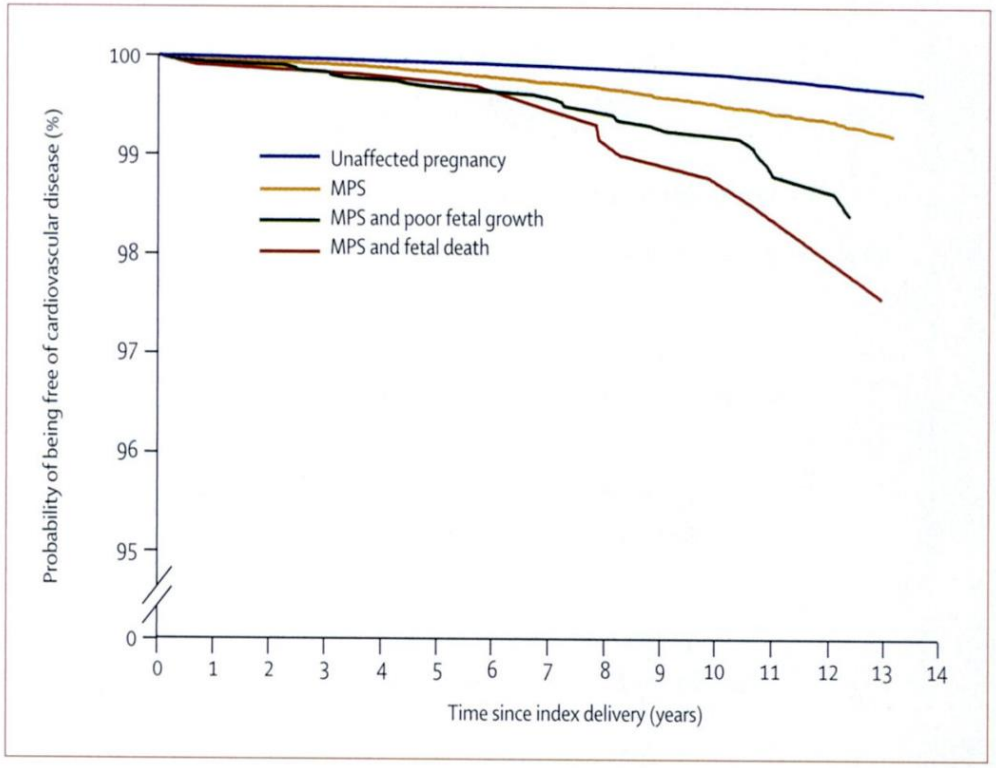
- **Gestational diabetes** was associated with
  - future diabetes
  - Hyperinsulinaemia
- **Hypertensive disorders of pregnancy** were associated with
  - obesity
  - Future hypertension
  - dyslipidaemia
  - hyperinsulinaemia

  } Metabolic syndrome
- **Large for gestational age** was associated with
  - Abdominal obesity
  - diabetes
- **Small for gestational age** and **preterm delivery** were associated with
  - hypertension

Fraser A et al. Avon Longitudinal Study of Parents and Children. Circulation 2012; 125:1367

Increased risk of premature IHD after a maternal placental syndrome or effected foetus



- Maternal placental syndromes:
  - Pre-eclampsia
  - Gestational hypertension
  - Placental abruption
- Foetal complications
  - Small for gestational age
  - Spontaneous preterm birth

Canadian population-based retrospective study
1.03 million women free from CV disease before delivery

Ray JG et al. CHAMPS. Lancet 2005;366:1797

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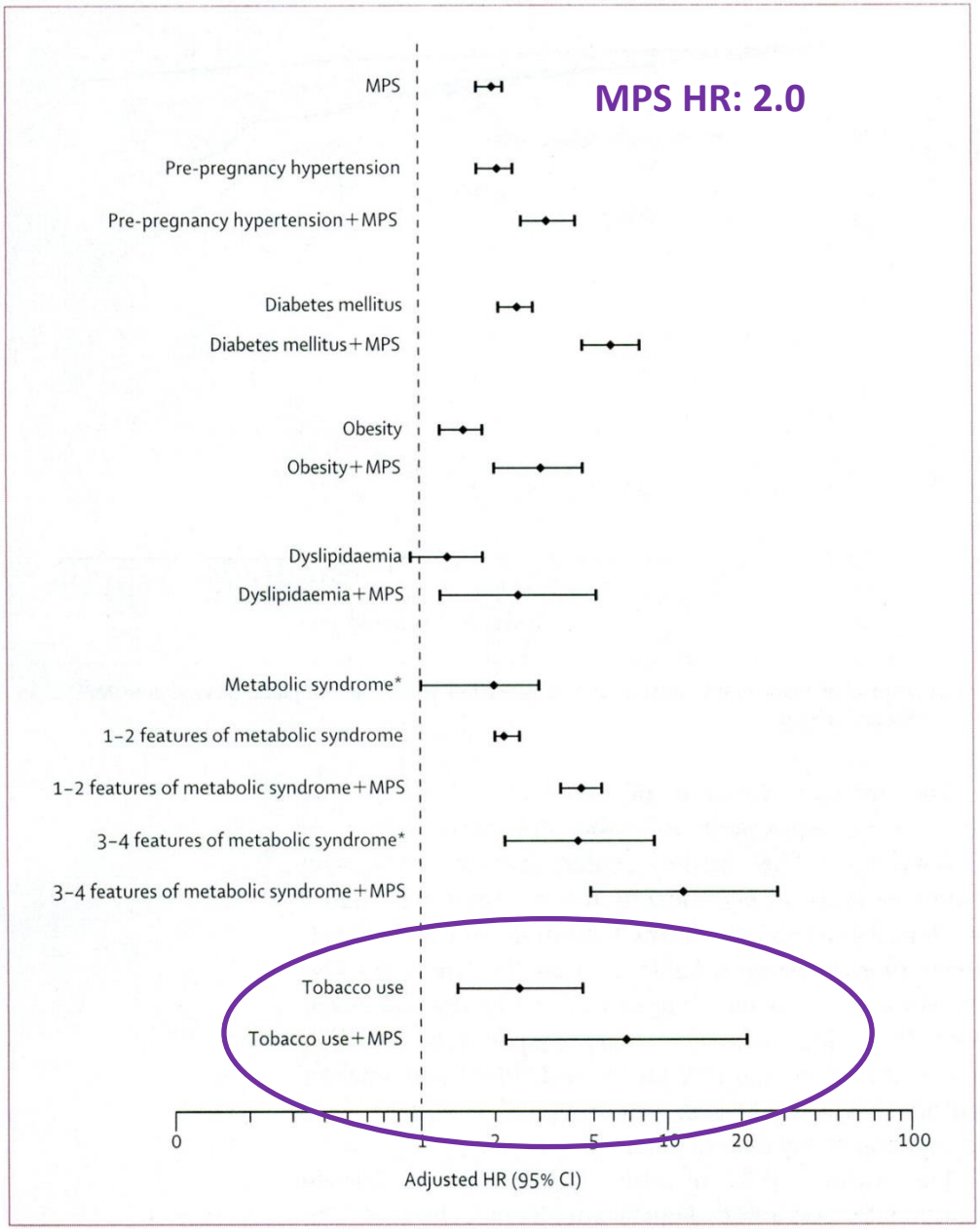
Premature IHD risk



Maternal placental syndrome

&

Other CV risk factors

Additive CV risk

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Ray JG et al. CHAMPS. Lancet 2005;366:1797

- Elevated waist circumference with ethnicity specific values defined by the International Diabetes Federation, which for women is ≥80cm for all ethnicities
- Elevated triglycerides of ≥1.7 mmol/L, or drug treatment for this lipid abnormality
- Reduced HDL cholesterol of <1.3 mmol/L, or drug treatment for this lipid abnormality
- Elevated systolic blood pressure of ≥130mmHg and/or diastolic blood pressure of ≥85mmHg, or antihypertensive drug treatment
- Elevated fasting glucose of ≥5.6 mmol/L, or drug treatment of elevated glucose.

Metabolic Syndrome Definition

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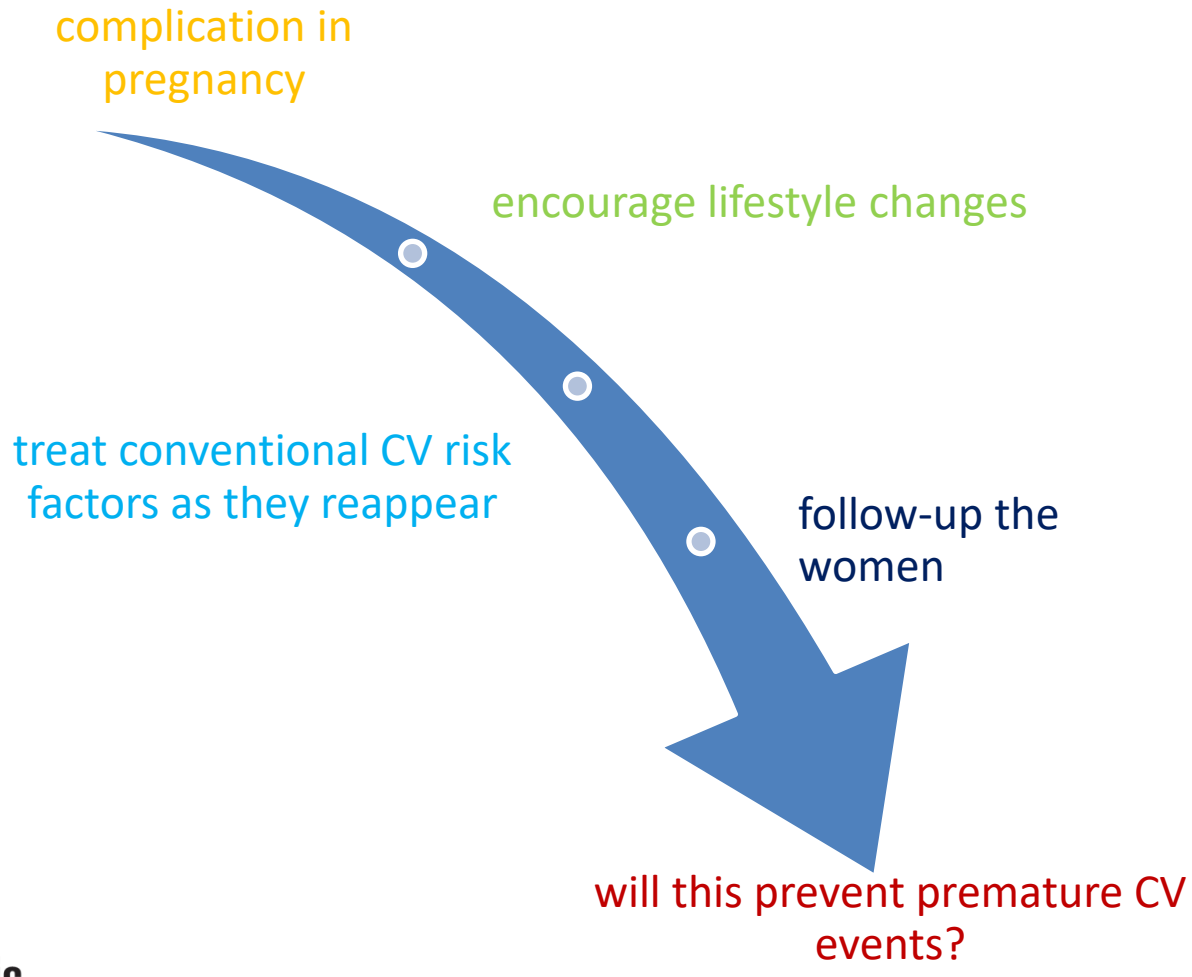
What can we do to prevent or delay cardiovascular disease?

THE COFFEE CLINIC

CARDIOVASCULAR ASSESSMENT AFTER OBSTETRIC COMPLICATIONS.
FOLLOW-UP FOR EDUCATION AND EVALUATION

Is there a case to focus cardiac rehabilitation & prevention skills here?



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The MotHERS Program™

Mothers' Health Education, Research & Screening

Before Pregnancy

It pays to be prepared. Preconception planning offers the best outcome for your baby. Everything you need to know about preconception screening tests, folic acid supplements, genetic counselling, medical complications and infertility.

Learn more

During Pregnancy

Over the next 40 weeks, you may have questions or concerns about your pregnancy and your developing baby and how both will be monitored. This section contains information about some of the things you may encounter during the course of your pregnancy.

Learn more

Newborn Care

The learning curve is steep, and the hours of sleep are few - but soon you will find yourself falling into a pattern and feeling comfortable in your new role. This section offers help with some of the things you will experience after delivery.

Learn more

Postpartum Health

Congratulations, your baby has arrived! While you will be preoccupied caring for your newborn, there is one more important person you need to take care of in the postpartum period - yourself.

Dr Graeme Smith

Learn more

https://www.themothersprogram.ca/postpartum-health/postpartum-health

Maternal Heart Clinic in Kingston, Canada: first 18 months experience

Eligibility criteria

- Preeclampsia
- Hypertension in pregnancy
- Gestational diabetes
- Spontaneous preterm delivery
- Small for gestational age baby

Logistics of the clinic

- Referred at time of delivery
- Review at 6 months post-partum
- Pre-clinic bloods & urine
  - Lipids
  - Glucose
  - HbA_1c
  - Abnormal urinalysis
- History & examination
- Calculate 30 year CV risk
- Face to face counselling

Cusimano MC et al. Am J Obs Gyn 2014;210:438e1-9

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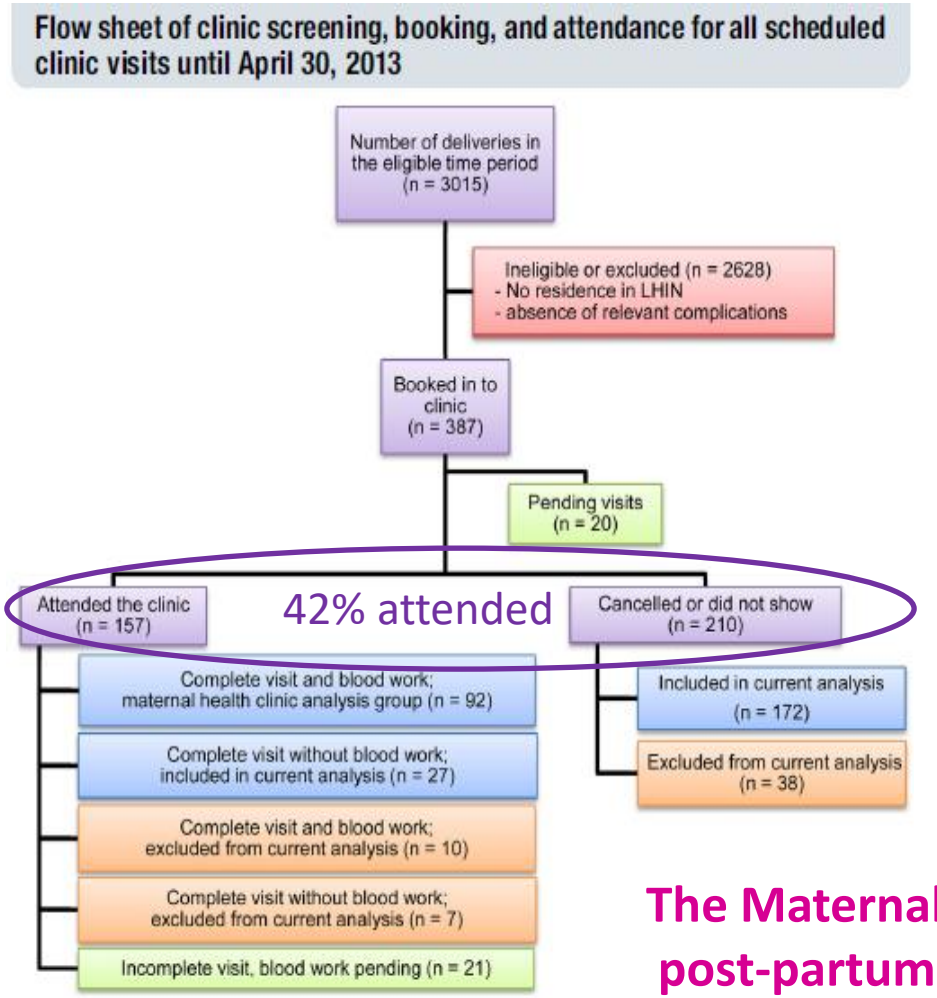
Maternal Heart Clinic in Kingston, Canada: first 18 months experience



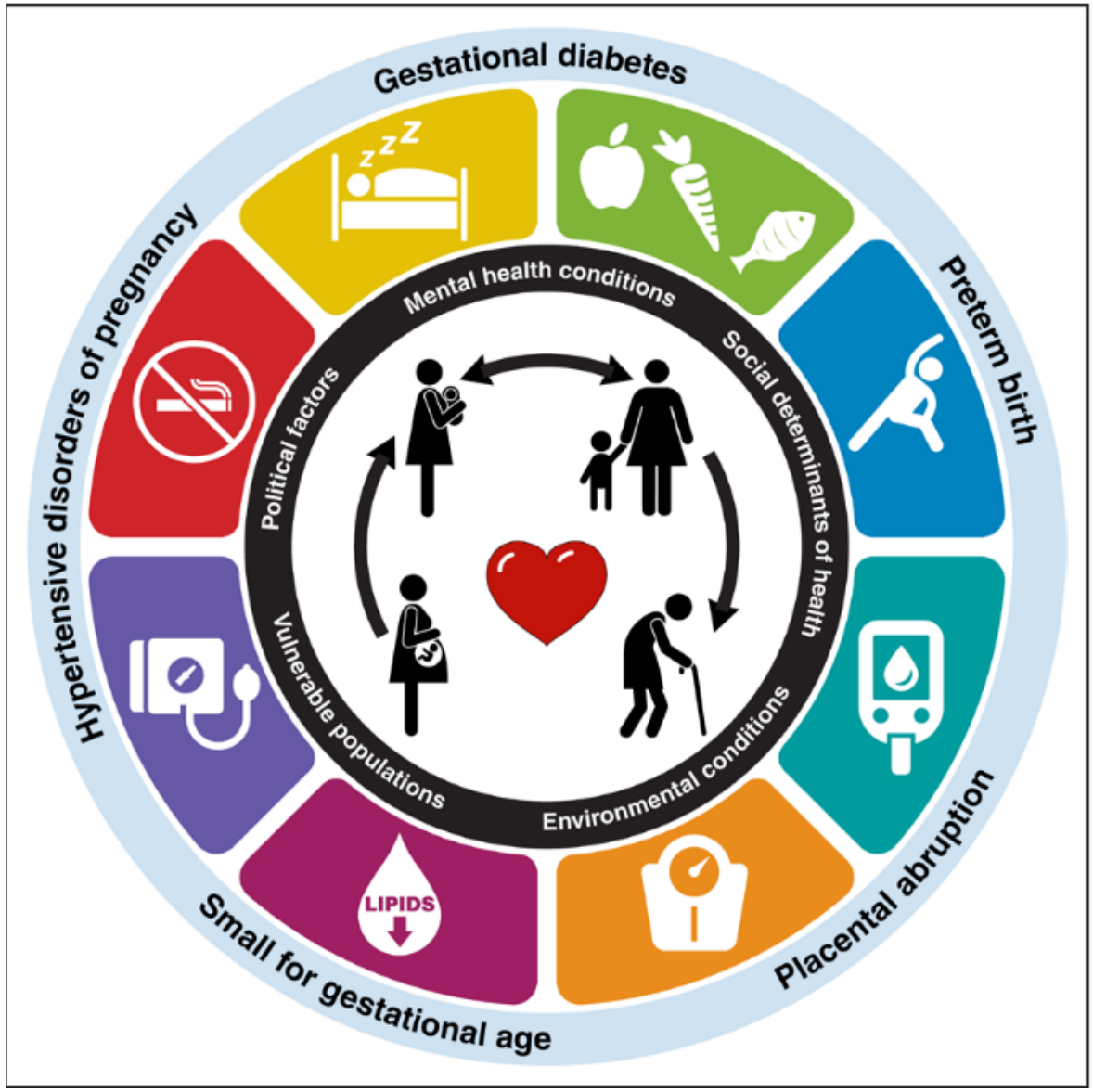
	MHC n=92	Healthy control n=118	
CVD risk factors -optimal -1 major -≥2 major	 16.3% 19% 9.8%	 54.2% 5% 0%	P<0.01
30yr CVD risk Median + IQR	7.5 5.9-12	5.3 4.0-7.0	P< 0.0001
Metabolic syndrome	17.4%	6.8%	P<0.05

The Maternal Health Clinic accurately identifies post-partum patients that have underlying CVD risk

Cusimano MC et al. Am J Obs Gyn 2014;210:438e1-9

Current American Heart Association recommendations

- Women want the best for their baby and family
- Pregnancy is a great opportunity for improving women's health
- Pregnancy complications can be predictors of future CV disease
- We need to increase awareness of this as a unique CV risk factor
- We need to educate women who have "declared their risk" on how to have a healthier lifestyle and treat this CV risk, hopefully preventing CV disease.



Cardiovascular assessment after Obstetric complications. Follow-up For Education and Evaluation

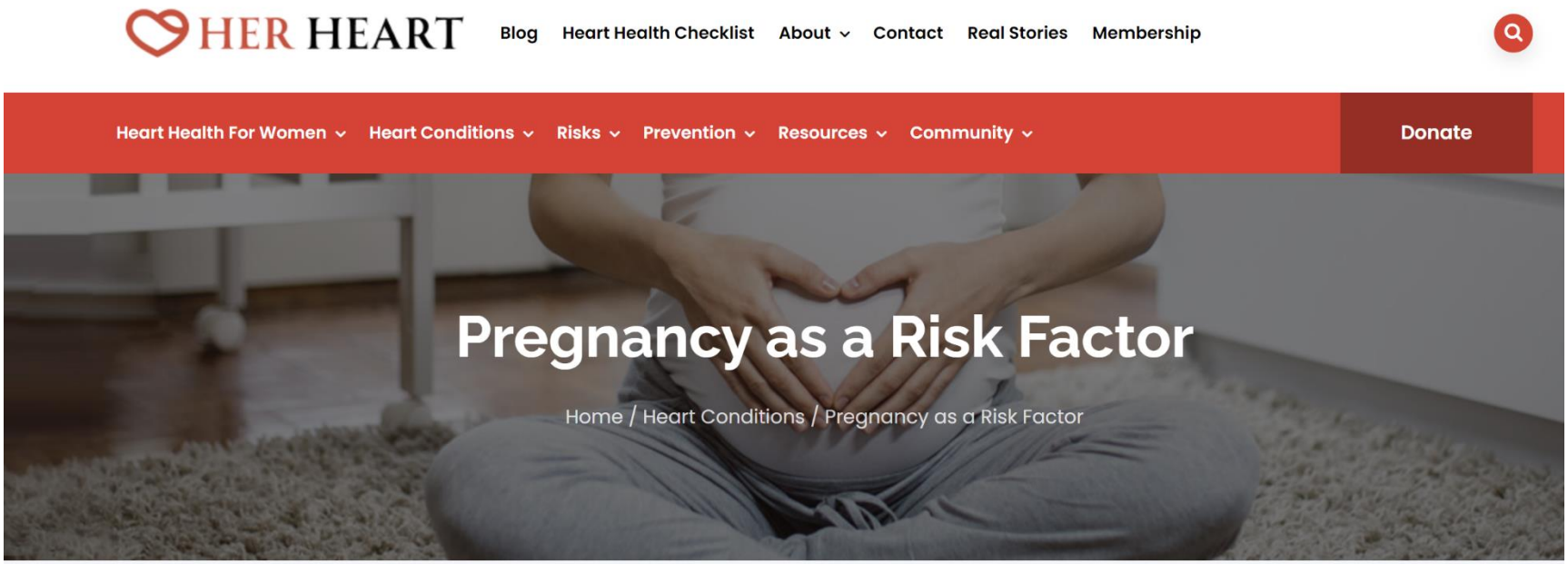
Nurse practitioner counselling and management

Evaluation of effectiveness of the interventions

Registry & Biobank for future research and long-term outcomes

Development of digital and social media to support women

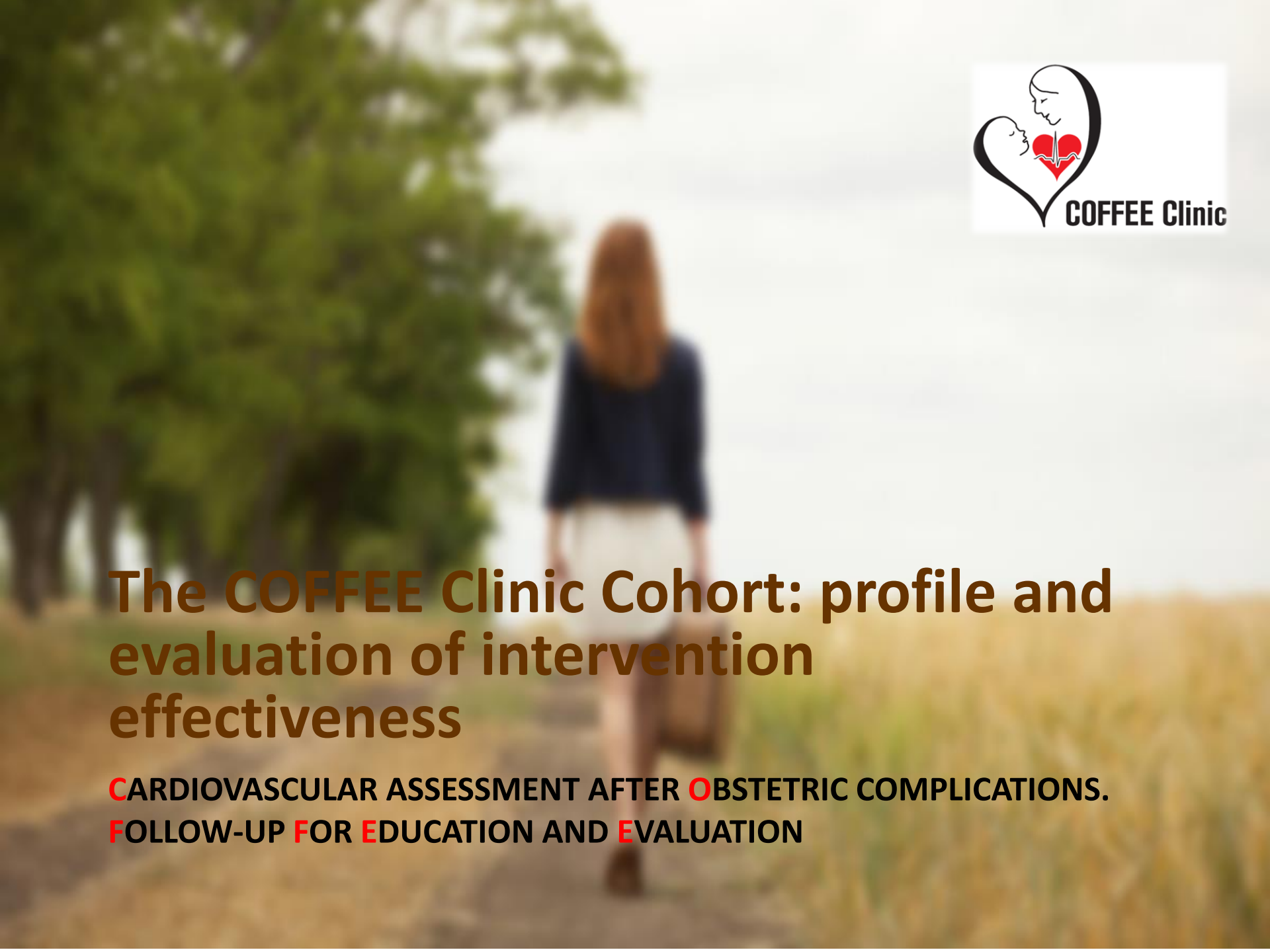
COFFEE Clinic resources



Quicklinks

- Overview
- Gestational Diabetes: Diabetes During Pregnancy
- Resources
- High Blood Pressure Conditions During Pregnancy
- Long Term Health Risks of Preterm Birth

https://www.herheart.org



The COFFEE Clinic Cohort: profile and evaluation of intervention effectiveness

CARDIOVASCULAR ASSESSMENT AFTER OBSTETRIC COMPLICATIONS. FOLLOW-UP FOR EDUCATION AND EVALUATION

COFFEE Clinic

frontiers in Cardiovascular Medicine

ORIGINAL RESEARCH
published: 14 March 2022
doi: 10.3389/fcvm.2022.853851

Prevalence of Metabolic Syndrome in Women After Maternal Complications of Pregnancy: An Observational Cohort Analysis

Emily Aldridge[1,2,3*], *Maleesa Pathirana*[1,2], *Melanie Wittwer*[1,3], *Susan Sierp*[3], *Shalem Y. Leemaqz*[4], *Claire T. Roberts*[1,4], *Gustaaf A. Dekker*[1,5] *and Margaret A. Arstall*[1,3]

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247 women with pregnancy complication

69% of attendees were unaware of the link between pregnancy complications and CV risk

89 (36%) had metabolic syndrome

227 (93%) had one or more component of metabolic syndrome

Aldridge *et al. BMC Women's Health* (2022) 22:461
https://doi.org/10.1186/s12905-022-02035-y

BMC Women's Health

RESEARCH Open Access

A prospective registry analysis of psychosocial and metabolic health between women with and without metabolic syndrome after a complicated pregnancy

Emily Aldridge[1,2,3*], K. Oliver Schubert[1,4,5], Maleesa Pathirana[1,2], Susan Sierp[3], Shalem Y. Leemaqz[6], Claire T. Roberts[1,2,6], Gustaaf A. Dekker[1,2,7] and Margaret A. Arstall[1,3]

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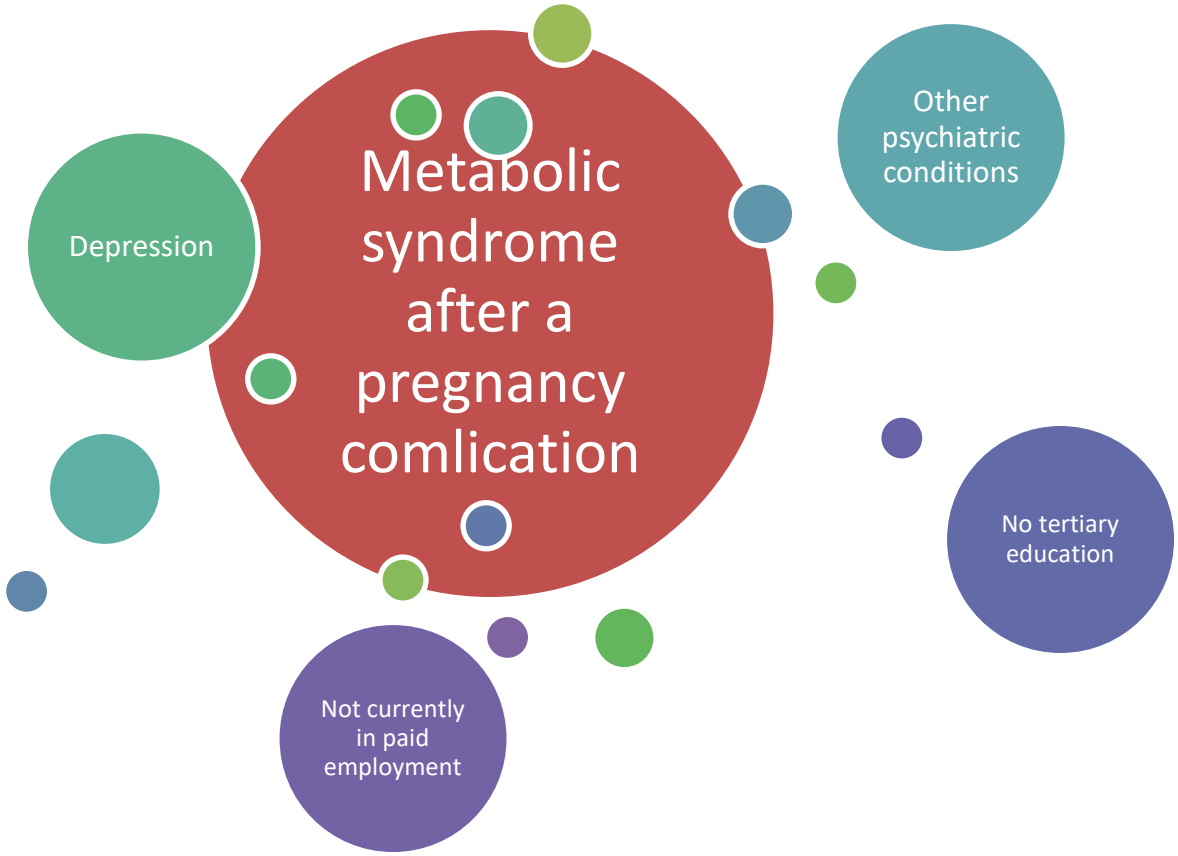

There is a relationship between Mental Health, Social Determinants of Disease and Metabolic Syndrome in these women

Aldridge *et al.*
Diabetology & Metabolic Syndrome (2022) 14:144
https://doi.org/10.1186/s13098-022-00916-8

Diabetology &
Metabolic Syndrome

RESEARCH Open Access

Effectiveness of a nurse practitioner-led cardiovascular prevention clinic at reduction of metabolic syndrome following maternal complications of pregnancy: a preliminary analysis

Emily Aldridge[1,2,3*], Maleesa Pathirana[1,2], Melanie Wittwer[1,3], Susan Sierp[3], Shalem Y. Leemaqz[4], Claire T. Roberts[1,2,4], Gustaaf A. Dekker[1,2,5] and Margaret A. Arstall[1,3]

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34.4% had MetS

n=64

6-months postpartum

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MetS at 6 months:

37 stayed the same

8 improved

No MetS at 6 months:

14 stayed the same

5 developed MetS

29.7% had MetS*

n=64

18-months postpartum

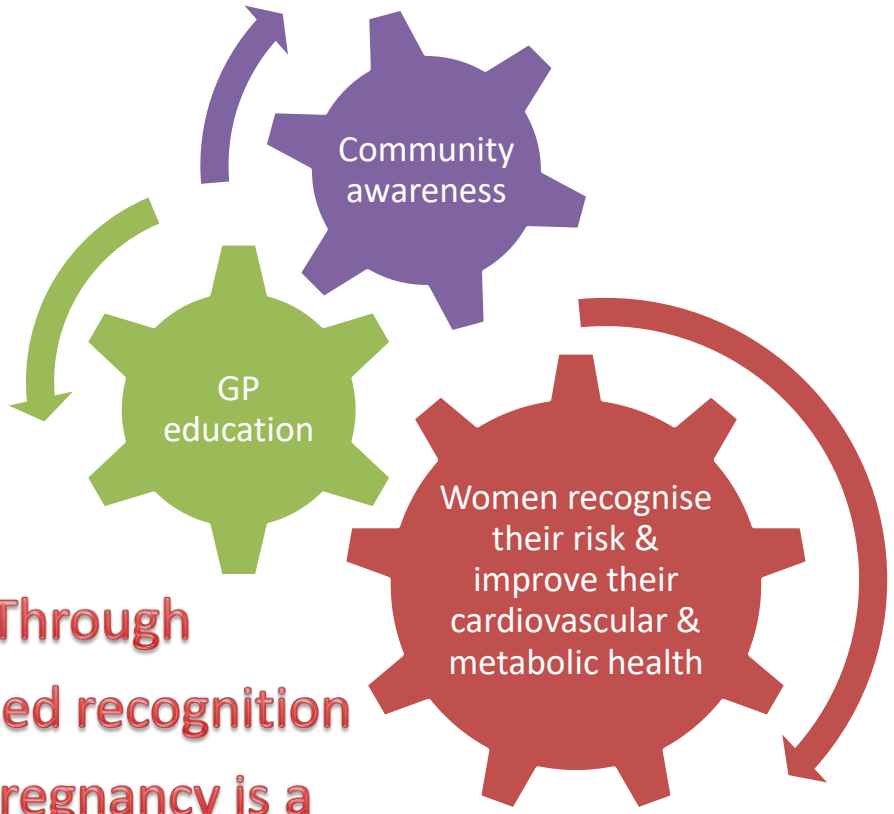
Pilot evaluation of the effect of COFFEE Clinic intervention

Ongoing and Future Research

- Women are invited to be part of our **clinical registry**
  - Patient demographics
  - Mental health survey
  - Nutritional survey
  - Cardiovascular function
  - 5 year follow-up to assess health outcomes
- Women are also invited to donate to the **Biobank**
  - Future mechanistic biochemical and genetic studies
- Collaborations with other researchers
  - Determine pathophysiological mechanisms
  - Consider new interventions
    - Breast feeding to reduce incidence of metabolic syndrome
    - CBT for weight loss
    - Dietary interventions

How will the COFFEE clinic succeed?

COFFEE Clinic
Cardiovascular assessment after obstetric complications: follow-up for education and evaluation



Through increased recognition that pregnancy is a cardiovascular stress test for women

So how can GP shared care play a role?

Increased awareness

Ongoing CV risk reduction

Support for the women and their families

COFFEE Clinic

- Acknowledgments:

- COFFEE participants
- Sue Sierp Nurse Practitioner
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- Dr Melanie Wittwer,
- Dr Prabha Andraweera
- Dr Adeel Khoja
- Dr Alison Care
- Evie Lovell