

## The Gestational Diabetes Epidemic A Practical Guide

Presented by  
Clinical Associate Professor  
Jencia Wong BSc MScB Paed FRCO

Healthed  
Sydney Women's and Children's Update  
23 February 2019



## Disclosure

Dr Wong and on behalf of the institutions to which she is affiliated has received research funds, travel grants and speaker or advisory honoraria from various companies, including Eli Lilly, Boehringer-Ingelheim, Novo Nordisk, Merck, AstraZeneca, Bristol-Meyers Squibb, Novartis, Sanofi and Servier.

## Objective: A Guide for the Perplexed

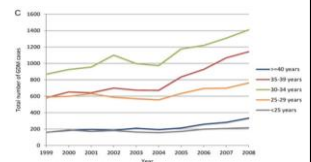
- Diagnostic Criteria
- Who, when and how to test for hyperglycaemia in pregnancy
- Main principles of GDM management
- Post partum principles



## How Big is the Problem?

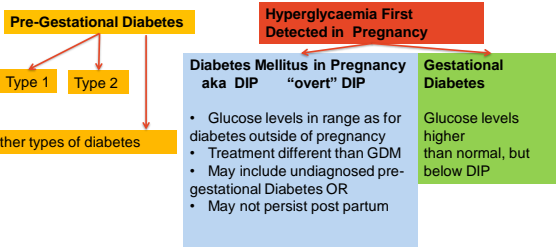
At least one in seven pregnancies in Australia is affected by diabetes.

Can be as high as one in three pregnancies in some areas.



A population-based observational study of diabetes during pregnancy in Victoria, Australia, 1999-2008. Marjion Abouzeid et al. BMJ Open 2014;4:e005394

## Diabetes and Pregnancy : Nomenclature



## Case: Mia

- 39 years, journalist
- Australian Anglo Celtic background
- Second pregnancy 8/40 seeking advice
- Last pregnancy GDM diagnosed at 24 weeks
  - Rx diet.
  - baby 3670g
  - 39/40 NVD
- Post partum glucose test (another practice) 'normal'
- No other medical Hx
- Family history of type 2 diabetes in mother (aged 60), brother has IGT.
- Observations
  - Bp 100/68
  - BMI 28kg/m<sup>2</sup>
  - 76kg
  - TSH 2.1IU/L

## Hyperglycaemia in pregnancy : if diagnosed what are the risks for Mia and baby?

### Risk for mother

- Pregnancy complications
  - Pre eclampsia, caesarian delivery, pre term delivery
- Long term risk of diabetes and metabolic syndrome
  - 50% lifetime risk of T2DM

### Risk for child

- Macrosomia, prematurity, shoulder dystocia, neonatal hypoglycaemia
- Evidence suggests long term risk of obesity, diabetes and metabolic syndrome
  - Epigenetic changes to genes with in-utero exposure to type 2 diabetes

Severity of complications increase with higher glucose levels

## Diagnosis of GDM

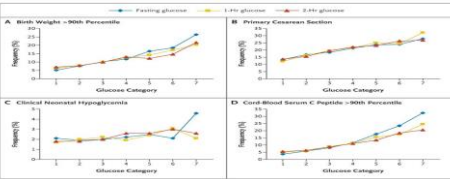
- All pregnant women without diagnosed diabetes should be tested for hyperglycaemia in pregnancy
- Usual testing for diabetes at 24 to 28 weeks' gestation using a 75 g OGTT
- **GDM diagnostic criteria**
  - (WHO /IADPSG) in Australia
- GDM diagnostic criteria differ in early pregnancy

Second and Third trimester glucose testing		
	Test 75 gm OGTT	Diagnostic threshold
GDM	Fasting glucose	5.1-6.9 mmol/l
	1 hr glucose post challenge	≥10.0 mmol/l
	2hr glucose post challenge	8.5-11 mmol/l
Note : only one test needed to diagnose.		

## HAPO study:

### linear association between (any) glucose and outcomes

The Hyperglycemia and Adverse Pregnancy Outcome (HAPO) Study



N ~25,000  
15 Centres

The HAPO Study Cooperative Research Group.  
N Engl J Med 2008;358:1991-2002

## A word about diagnostic criteria for GDM



WHO	➤ IADPSG criteria for GDM
Endocrine Society	➤ One-step screening strategy with IADPSG criteria
ADA	Options between: ➤ One-step screening strategy with IADPSG criteria OR ➤ Two-step screening strategy with 50g GCT and 100g OGTT with the Carpenter & Coustan criteria or the NDDG criteria
NIH	➤ Two-step screening strategy with 50g GCT and 100g OGTT with the Carpenter & Coustan criteria or the NDDG criteria
ACOG	➤ Two-step screening strategy with 50g GCT and 100g OGTT with the Carpenter & Coustan criteria or the NDDG criteria

WHO: World Health Organization; ADA: American Diabetes Association; NIH: National Institute of Health; ACOG: American College of Obstetricians and Gynecologists; IADPSG: The International Association of Diabetes and Pregnancy Study Groups; GCT: glucose challenge test; OGTT: oral glucose tolerance test; NDDG: National Diabetes Data Group

## What are Mia's risk factors for hyperglycaemia in pregnancy?

### RISK FACTORS for HYPERGLYCEMIA in PREGNANCY

- Maternal Age ≥40years
- Previous GDM or DIP
- Previous elevated glucose level
- High risk ethnicity: Asian, Indian, Aboriginal and Torres Straight Islander, Pacific Islander, Maori, African, Middle Eastern
- Family history (first degree rel with diabetes or sister with GDM)
- Pre pregnancy BMI >30kg/m<sup>2</sup>
- Previous Macrosomia (>4500g or >90<sup>th</sup> centile)
- PCOS
- Medications : steroids/ Antipsychotics

## Should you arrange for Mia to have glucose testing now or wait for the "usual" time 24-28 weeks ?

- Test now
- All pregnant women without diagnosed diabetes should be tested for hyperglycaemia in pregnancy.
- **Women at higher risk should be tested early in pregnancy— around the time of the first antenatal visit namely to diagnose DIP.**
- Mia should have early testing as she has risk factors for hyperglycaemia in pregnancy

## First Trimester Glucose testing in High risk women

- **Fasting glucose or HbA1c or OGTT?**
  - Fasting glucose or HbA1c in general for first trimester testing
  - OGTT can be used at anytime if concerned
  - MBS HbA1c not included as pregnancy test but can be requested 12monthly if at high risk
- Note one test only diagnostic
- OGTT 1hr result not relevant for DIP
- \*Controversial Criteria for Early GDM. Some recommend usual GDM thresholds

First trimester glucose testing		
Category	Test	Diagnostic Threshold
DIP	fasting	≥7mmol/l
	2 hr post challenge	≥11.1 mmol/l
	Random +syx	≥11.1 mmol/l
	HbA1c	≥6.5% (48mmol/mol)
	Fasting glucose	≥6.1-6.9 mmol/l
Early GDM*	Fasting glucose	≥6.1-6.9 mmol/l
	HbA1c	≥5.9% (41 mmol/mol)

## "Early GDM" seems to be a higher risk condition than "Standard GDM"



Mia's fasting glucose was 4.9mmol/l at 8 weeks gestation

## Oral Glucose Tolerance Test in Pregnancy

### Potential pregnancy issues

1. **Acute Illness**—postpone
2. **Fasting for religious reasons such as Ramadan**
  - if possible schedule before/ after
  - if immediate testing is needed measure fasting blood glucose consider measuring HbA1c
3. **Vomiting**
  - Chilled and recliner
  - if the fasting glucose normal, repeat the OGTT antiemetic beforehand (eg metoclopramide) ondansetron may lower the blood glucose during OGTT.
4. **Following bariatric surgery**—most women can tolerate an oral glucose tolerance test so proceed normally unless severe dumping syndrome.
5. **If cannot tolerate, seek specialist advice.**

## How will you advise Mia re weight gain in pregnancy?

- Mia's BMI is in overweight range
- Elevated BMI independently associated with increased risk of pregnancy complications
  - ~30% exceeded target by time of GDM diagnosis so early advice important

IOM guidelines for weight gain during pregnancy	
Pre pregnancy BMI (kg/m <sup>2</sup> )	Recommended weight gain (kg)
<18.5	12.5-18
18.5-24.9	11.5-16
25-29.9	7-11.5
≥30	5-9

## Despite normal glucose test in first trimester should Mia be retested at 24-28 weeks gestation?

### Yes !

- Insulin resistance increases in pregnancy

Second and Third trimester glucose testing		
Category	test	Diagnostic threshold
ODM	Fasting glucose	5.1-6.9 mmol/l
	1 hr glucose post challenge	≥10.0 mmol/l
	2hr glucose post challenge	8.5-11 mmol/l
DIP	Fasting glucose	≥7mmol/l
	2 hr glucose post challenge	≥11.1 mmol/l
	Random glucose +syx	≥11.1 mmol/l

Note : only one test needed to diagnose. 1hr glucose is not relevant to DIP

## Mia's OGTT at 24 weeks

- Fasting glucose 5.5mmol/l
  - 1hr glucose 9.8mmol/l
  - 2 hr glucose 8.7mmol/L
- **Referral** to specialised antenatal diabetes service for management
  - Ideally multidisciplinary
  - **Register** with the National Diabetes Services Scheme (NDSS) and the National Gestational Diabetes Register,
  - **Components of management**
    - Education (DNE)
    - SMBG
    - Dietary advice
    - Low to moderate physical activity
    - Medical therapy
  - **Diagnostic of GDM**
  - **Now what?**

### What dietary advice?

- Registered Dietician
  - 3 meals and 3 snacks
  - The usual recommended carbohydrate intake is 150 to 180 g per day for a singleton pregnancy, lower GI
  - Keto diets not recommended
  - Watch weight gain and CHO restriction (ask patient describe day)
  - 10-15 min post prandial walking can reduce pp glucose



Lifestyle controls~50% GDM

### How would you advise Mia to test and what Glucose targets should Mia be advised to aim for?

- SMBG
  - Usually 4x day
  - Fasting and 1 or 2hr post prandial
  - Can individualise frequency after 2-3 weeks
- Targets not universally agreed
  - No evidence base supports specific targets.
  - Australasian Diabetes in Pregnancy Society guidelines :
    - Fasting capillary blood glucose:  $\leq 5.0$  mmol/L
    - 1-hour blood glucose:  $\leq 7.4$  mmol/L
    - 2-hour blood glucose:  $\leq 6.7$  mmol/L
  - Local Guidelines vary as to target and as to whether 1 hr or 2 hr reading used

### Insulin in GDM

#### Fasting hyperglycaemia

- intermediate-acting or long-acting insulin can be used at bedtime.
- common starting doses are 4-8 units.
- The dose should be adjusted every two to three days to achieve target BGLs.

#### Postprandial hyperglycaemia

- dietary education and review
- Short-acting insulin analogue before the affected meal(s).
- Starting doses are generally 4-8 units.
- The dose should be adjusted every two to three days to achieve target BGLs.

Type	Dose (units)	Time the insulin is given	Time the insulin is given	Time the insulin is given	Time the insulin is given	When to give insulin	When to give insulin	When to give insulin	When to give insulin
Fast	4-8	-	-	-	-	Once Daily			
Mid	6-10	7:00	8:00	9:00	10:00	Once Daily			
Mid	6-10	12:00	13:00	14:00	15:00	Once Daily			
Mid	6-10	18:00	19:00	20:00	21:00	Once Daily			
Mid	6-10	-	-	-	-	Once Daily			
Mid	6-10	-	-	-	-	Once Daily			
Mid	6-10	-	-	-	-	Once Daily			
Mid	6-10	-	-	-	-	Once Daily			
Mid	6-10	-	-	-	-	Once Daily			

?

Type of Insulin	Insulin Injections				Monitoring Blood					
	Dose (units)	Time	Time	Time	Time	Time	Time	Time		
Mid					5.0	5.3	5.5	6.0	5.4	6.0
Fast					4.9	5.0	5.5	5.9	6.0	6.3
Mid					5.0	5.3	6.0	6.3	5.5	6.0
Fast					5.0	5.3	6.0	6.3	5.5	6.0
Mid	10	6	6	16	4.9	5.0	5.5	5.9	5.0	5.5
Fast					4.9	5.0	5.5	5.9	5.5	5.9
Mid					5.0	5.3	5.5	5.9	5.5	5.9
Fast					5.0	5.3	5.5	5.9	5.5	5.9
Mid					4.9	5.0	5.5	5.9	6.0	6.3
Fast	6	6	6	16						

### Reality

Type of Insulin	Insulin Injections				Monitoring Blood					
	Dose (units)	Time	Time	Time	Time	Time	Time	Time		
Mid					5.0	5.3	6.0	6.3	5.9	1.0
Fast					5.3	5.5	6.5	6.9	1.5	1.0
Mid					5.0	5.3	6.0	6.3	5.5	6.5
Fast					5.9				7.6	
Mid	10	6	6	16	1.1	1.9	1.6	0.0	0.8	1.5
Fast					0.0	2.7	1.7	1.8	1.7	1.2
Mid					5.1	1.1	1.8	1.5	1.4	2.0
Fast					5.2	1.5	1.6	1.7	1.0	1.5
Mid	10	14	30		1.8	1.1	1.1	1.5	1.5	
Fast					1.8	1.5	1.5	1.5		
Mid					1.8	1.5	1.5	1.5		
Fast					1.8	1.5	1.5	1.5		

Always check glucose meter

### Why not use oral agents?

#### Metformin

- not as good fasting glucose control if fasting  $> 5.8$  mmol/l metformin monotherapy unlikely enough
- Long term effects on offspring unknown
- Avoid renal/IUGR
- May consider
  - Needle phobia
  - Refuses insulin
  - Poor adherence
  - Excessive insulin related weight gain
  - Check vit B12

#### Sulphonylurea

- Not commonly used in Australia
- Crosses placenta
- $\beta$  cell effects unknown
- Larger babies
- Risk of neonatal hypo

## Mia's progress

- Doing well on
  - Intermediate insulin 30 units pre bed
  - 10 units fast acting insulin pre meal (TDD 60 unit insulin)
- Fasting BSL dropped to hypo range
- Reduction in intermediate insulin advised
- Advise further?
- Generally insulin requirements increase in throughout pregnancy although for some decline in late pregnancy
- **Falling insulin requirements (>15-30%) may signal placental insufficiency in pre-gestational diabetes (may be for GDM)**
- recommendation that should have increased surveillance and investigation for adverse obstetric outcomes.

## Labour and post partum

- **Stop insulin / metformin at onset or fasting**
  - 2 hrly glucose monitoring in labour
  - During labour, aim for tight glycaemic control (eg 4 to 6.7 mmol/L) to reduce the risk of neonatal hypoglycaemia.
  - Supplemental insulin or infusion may be needed (usually not)
- **Post partum insulin therapy ceased**
  - BF encouraged
  - Infant monitored for hypoglycaemia,
  - SMBG for 24 hrs (fasting and 2hr pp)
- **Mia's Progress**
  - NVD 38+4/40
  - Ella 3425gm
  - No neonatal hyperglycaemia
  - Breast Feeding
  - Discharged next day
  - SMBG in hospital normal

## Post Partum Follow up

- **Should you repeat the OGTT? If so how often?**
- **Yes (even if SMBG normal post partum)**
  - 75g 2 hr OGTT 6-12 weeks pp (or 4-6 months!)
  - If Pre diabetes (pregnancy in future)-retest 1-2 years with OGTT
  - If Normal HbA1c or OGTT
    - 2-3 yearly
- **What is Mia's risk of hyperglycaemia in the future?**
- **30-80% risk of hyperglycaemia in future pregnancy**
  - BMI reduction of 2kg/m<sup>2</sup> reduces risk of subsequent GDM by >70%
  - Contraception
  - Preconception counselling

## The emotional burden of GDM

### At diagnosis (n=198)



### Post natal visit (n=49)



## In Summary

- **Hyperglycaemia in pregnancy now reclassified as**
  - DIP or
  - GDM
- **Early pregnancy glucose testing recommended for women with risk factors for hyperglycaemia**
- **Women should be advised re personalised weight gain target**
- **Thresholds and mode of testing in early GDM are controversial**
- **If normal early test, retesting of high risk women 24-28 weeks recommended**
- **Targets for Rx also vary as evidence base still weak**
- **Lifestyle diet cornerstones**
- **Post partum management**
  - Testing for diabetes /prediabetes
  - Weight management
  - Contraception
  - Preconception counselling
  - Modelling and familial healthy lifestyle
- **Negative emotional impact of a diagnosis of GDM**