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Diabetes in Pregnancy
Registrar Induction Programme

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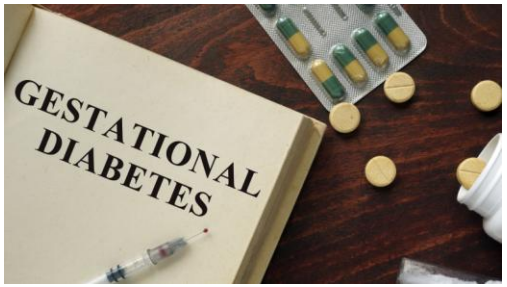


Diabetes in pregnancy

- Why it matters
- What our service looks like
- How we diagnose and manage GDM
- Patients with pre-existing diabetes
  - pre-conception care
  - Antenatal care
- Complications
  - hypoglycaemia
  - DKA
- Inpatient protocols
- Resources

Why does it matter?
Fetus

Pre-existing diabetes	Gestational
miscarriage	neonatal hypoglycaemia
congenital malformation	perinatal death
stillbirth	
neonatal death	
fetal macrosomia	
birth trauma (to mother and baby)	
induction of labour or caesarean section	
transient neonatal morbidity	
obesity and/or diabetes developing later in the baby's life	

Why does it matter?
Mother

- Miscarriage
- Pre-eclampsia
- Preterm labour
- Intrapartum complications

- Progression of microvascular complications
- Severe hypoglycaemia
- Ketoacidosis

- Death – approx one mother per year

The antenatal service

RIE

- DSNs: Susan, Joan
- Anna Dover, Alan Patrick, Nicola Zammitt, Alan Jaap, Rebecca Reynolds
- Claire Alexander, Nithiya Palaniappan, Corinne Love, Niv Aedla, Fiona Dennison
- Mon pm, Tues pm (MAC), Thurs pm

WGH

- DSNs: Jill, Liz
- Stuart Ritchie, Mark Strachan
- Claire Alexander, Corinne Love
- Tuesday pm

SJH

- DSNs: Eilidh, Anna
- Liesbeth Van Look, Karen Adamson
- Alison Macleod

Gestational Diabetes

- "carbohydrate intolerance of variable severity with onset or first recognition during pregnancy"
  - Includes women with undiagnosed type 1, type 2 or monogenic diabetes
  - Primarily refers to women with abnormal glucose tolerance which normalises post partum
  - Usually develops after 28 weeks gestation
- Complications (all reduced by intensive management)*
  - Macrosomia/shoulder dystocia (3%)
  - Neonatal hypoglycaemia (from neonatal hyperinsulinaemia)
    - 61% neonates admitted to SCBU
  - Neonatal death (1%)
  - Late intra-uterine death (1%)

*Crowther NEJM 2005

Screening for GDM

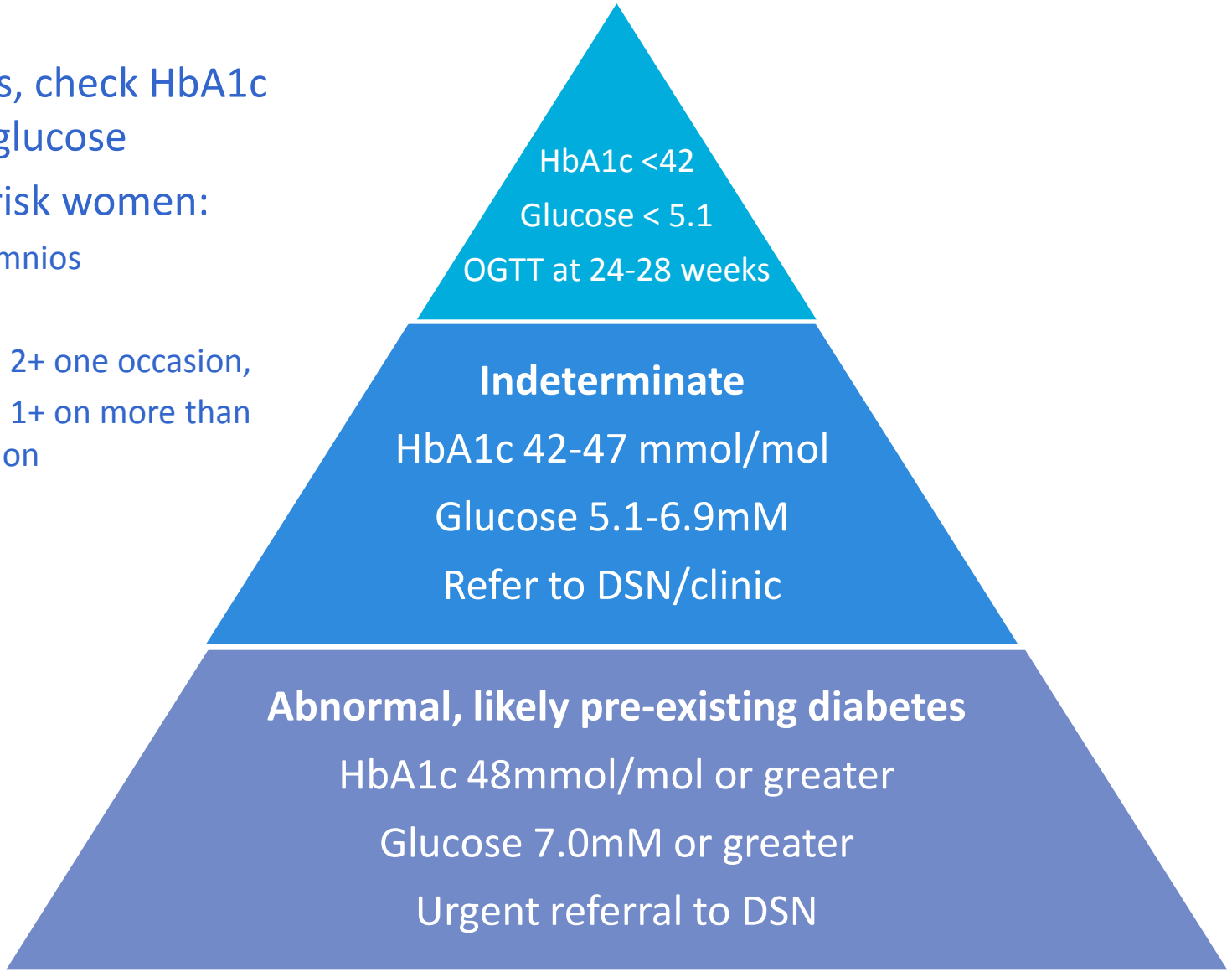
- New guidelines recently launched, combination of SIGN and NICE

- Assess all pregnant women for risk factors at booking:
  - body mass index above 30 kg/m2
  - previous macrosomic baby weighing 4.5 kg or above
  - previous gestational diabetes
  - family history of diabetes (first-degree relative with diabetes)
  - family origin with a high prevalence of diabetes:
    - South Asian (India, Pakistan or Bangladesh)
    - Black Caribbean
    - Middle Eastern (Saudi Arabia, United Arab Emarates, Iraq, Jordan, Syria, Oman, Qatar, Kuwait, Lebanon or Egypt)

- No risk factors, usual care

Screening for GDM

- If risk factors, check HbA1c and fasting glucose
- Also in low risk women:
  - Polyhydramnios
  - LGA
  - Glycosuria 2+ one occasion,
  - Glycosuria 1+ on more than one occasion



Diagnosing GDM

- 75g OGTT:
  - Administered after an 8 hour fast
  - Fasting glucose ≥5.1mM
  - 2 hour ≥ 8.5mM

Management of GDM

- Referred via community midwife to DSNs for group education and then joint clinic appt
- Metformin, up to 2g/d then basal bolus insulin
- Glucose targets
  - Fasting ≤5.5mM
  - Pre-prandial ≤6mM
  - 2 hour post-prandial ≤7mM
- Weekly CTG and liquor volumes from 36 weeks
- Induced before term if on therapy

- Treatment stopped once delivered
- OGTT (or fasting glucose) at 6-13 weeks, and annually thereafter

Pre-existing diabetes

- Main issue is pre-conception planning
  - HbA1c (as low as possible, certainly <53mmol/mol and <48mmol/mol if achievable)
  - Stop statins, ACE-inhibitors
  - Continue metformin
  - High dose (5mg) folic acid
  - Up to date retinal, renal and thyroid screening
  - Hypoglycaemia re-education
  - Refer to DSNs for pre-conception advice

- Antenatal management
  - Refer to guidelines
  - Early viability scan
  - Glucose targets 4-6mM preprandial, <7mM 2 hours postprandial
  - retinal screening in each trimester

Typical Antenatal Experience

- Minimum 30 visits to hospital
- Fortnightly visits until 30 weeks
  - Ultrasound scans (fetal anomaly, cardiac, fetal growth, liquor volumes)
  - Retinal scans (each trimester)
- Weekly visits until 36 weeks
- Twice weekly until around 39 weeks
- Minimal GP and community midwife contact

Hypoglycaemia

- Insulin requirements change during pregnancy due to gestational hormones

- Hypoglycaemia
  - Common (14-45% of patients experience a severe hypo)
  - Occurs most often during 1st trimester
  - Risk factors include previous severe hypos, diabetes duration, impaired hypoglycaemia awareness, erratic control

- Important that pre-pregnancy counseling includes hypoglycaemia re-education

- **Third trimester hypoglycaemia, or falling insulin requirements may signal placental insufficiency, urgently discuss with obstetric team**

Inpatient protocols

- Refer to ECED protocols
- Will require IV insulin sliding scale if BM ≥7mM or vomiting, and if starting steroids for pre-term labour
- Use 5% dextrose with 20mM KCl

- Pump patients to stay on pump, including intrapartum where feasible

- Postnatal care
  - GDM – stop all therapies, monitor BMs if suspicious of pre-existing diabetes
  - T1DM/T2DM – revert to pre-pregnancy doses (or lower if breastfeeding), metformin safe in breastfeeding

DKA in pregnancy

- Patients with T1DM
- Patient with T2DM or GDM
  - Glucocorticoids
  - B-agonists / tocolytics
- New presentation of T1DM in pregnancy

- Complicates around 1-3% of pregnancies, with fetal mortality of around 9%
- CMACE 2006-2008, 3 diabetes related maternal deaths, all ***hypoglycaemia***

What is different in pregnancy?

- Occurs at lower blood glucose level
- Can present more rapidly than in non-pregnant women

- Insulin resistance (esp $2^{nd}/3^{rd}$ trimester)
- Accelerated starvation (esp $2^{nd}/3^{rd}$ trimester)
- Nausea and vomiting common
- Reduced renal buffering of acid (pregnancy is a state of compensated respiratory alkalosis)

Why is it a concern?

- Fetal mortality (9%)

- Mechanisms of fetal loss
  - Fetal acidosis and electrolyte disturbance
  - Decreased placental blood flow (osmotic duiresis and volume depletion)
  - Fetal hypokalaemia leading to myocardial supression or arrythmias
  - Fetal hypoxia (maternal acidosis, low PO_4, hyperinsulinaemia)

How will it present?

- Outpatient/ Triage
  - nausea and vomiting
- De novo in a previously undiagnosed patient
- Inpatient
  - receiving steroids or tocolytics
- Usually 2^{nd}/3^{rd} trimester
- Check ketones in pregnant patients who are vomiting or have BM≥10mM

How to diagnose it?

- Hyperglycaemia (> 10mM)
- Acidosis (venous bicarbonate <18)
- Ketones (urine +, blood ketones >0.5)

What to do!

- Management of DKA involves
  - Aggressive fluid resuscitation
    - 1L 0.9% NaCl over 1 hour (+10% dextrose if BM <15mmol/L)
  - Insulin infusion
    - 6 units/hr
  - Close monitoring and replacement of electrolytes (particularly K^+ and PO_4)
  - Continuous fetal monitoring
    - Non reactive trace, repetitive late decelerations, non-reassuring profile may indicate fetal compromise but may reverse as metabolic insult is reversed

- **Discuss with antenatal diabetes consultant**

Useful resources

- Intranet A-Z
  - Reproductive Medicine
    - Antenatal policies and guidelines
      - Diabetes in Pregnancy (has a DKA section)
      - PoliciesAndGuidelines/Documents/MaternityPanLothian/Antenatal/DiabetesandPregnancy2003-13.pdf
  - ECED Handbook (and website) – Diabetes protocols
  - Diabetes
    - Inpatient resources
      - CSII insulin pump guide
  - AMU - DKA protocol

Summary

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