Diabetes in Pregnancy
Registrar Induction

Dr Anna Dover
August 31st 2015
Outline

• Joint Antenatal Diabetes Service
• Pre-existing diabetes
  – Pre-conception, antenatal management
• Gestational Diabetes
  – Screening, diagnostic criteria, referral pathway, glycaemic targets
• Inpatient protocols
• DKA in pregnancy
# Risks of diabetes (fetus)

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<th><strong>Pre-existing diabetes</strong></th>
<th><strong>Gestational</strong></th>
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<td>miscarriage</td>
<td>neonatal hypoglycaemia</td>
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<td>congenital malformation</td>
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<td>stillbirth</td>
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<td>neonatal death</td>
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<td>fetal macrosomia</td>
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<td>birth trauma (to mother and baby)</td>
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<td>induction of labour or caesarean section</td>
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<td>transient neonatal morbidity</td>
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<td>obesity and/or diabetes developing later in the baby’s life</td>
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Risks of diabetes (maternal)

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

- Progression of microvascular complications
- Severe hypoglycaemia
- Ketoacidosis

- Death – approx one mother per year
Joint Antenatal Diabetes Service

- Obstetricians: Corinne Love, Claire Alexander, Nithiya Pallaniappan, Niv Aedla (Fiona Dennison)
- Diabetologists: Anna Dover, Alan Patrick, Alan Jaap, Nicola Zammitt, Stuart Ritchie, Mark Strachan, (Rebecca Reynolds)
- DSNs: Susan Johnston, Joan Grant, Liza Mackay, Jill Little
- Pre-existing diabetes plus gestational diabetes
- Monday & Thursday afternoons (RIE), Tuesday afternoons (WGH), Metabolic clinic (RIE tues pm)
- ALL GDM and pre-existing diabetes patients
Pre-existing diabetes

- Main issue is pre-conception planning
  - HbA1c (as low as possible, certainly <53)
  - Stop statins, ACE-inhibitors
  - Continue metformin
  - High dose (5mg) folic acid
  - Up to date retinal and renal screening
  - Hypoglycaemia re-education

- Conceptt study
  - CGM in pregnant patients with T1DM
  - Refer as soon as pregnant

- Antenatal management
  - Refer to guidelines
  - Targets 4-7mmol/L
  - 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 39-40 weeks
- Minimal GP and community midwife contact
Hypoglycaemia during pregnancy

- 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
Gestational diabetes

- Defined as “carbohydrate intolerance of variable severity with onset or first recognition during pregnancy”
  - Includes women with undiagnosed type 1, type 2 or monogenic (MODY) DM
  - Primarily refers to women with abnormal glucose tolerance which normalises post partum
  - Usually develops after 28 weeks gestation

- Complications (all reduced by intensive management)
  - Crowther NEJM 2005
  - Macrosomia/shoulder dystocia (3%)
  - Neonatal hypoglycaemia (from neonatal hyperinsulinaemia)
    - 61% neonates admitted to SCBU
  - Neonatal death (1%)
  - Late intra-uterine death (1%)
Screening for GDM

• Controversial!

• Current Lothian screening programme:
  – Urinalysis at every ante-natal visit
    • Random venous plasma glucose if glycosuria detected
  – Random venous plasma glucose at booking and at 28 weeks
  – SJH offer GTT to all high risk patients at 28 weeks

• Previous GDM get HbA1c and fasting glucose at booking

• If random glucose >5.5mmol/L >2hrs after food, or >7mmol/L <2hrs after food, arrange OGTT
Diagnosis of GDM

- **75g OGTT:**
  - Fasting glucose ≥ 5.1 mM
  - 2 hour ≥ 8.5 mM

- **women in early pregnancy with levels of...**
  - HbA1c ≥ 6.5% (48 mmol/mol)
  - fasting glucose ≥ 7.0 mmol/l
  - two hour glucose ≥ 11.1 mmol/l
  - ...should be treated as having pre-existing diabetes

- **Note: NICE has different thresholds**
- **Be aware that GDM in early pregnancy may not be GDM!**
Management of GDM

- Referred via community midwife to DSNs for group education and then joint clinic appt
- Metformin then Insulin (or glibenclamide via GRACES study)
  - Fasting $\leq 5.5\text{mM}$
  - Pre-prandial $\leq 6\text{mM}$
  - 2 hour post-prandial $\leq 7\text{mM}$
- Weekly CTG and liquor volumes from 36 weeks
- Induced at term
- Insulin stopped once delivered
  - OGTT at 12 weeks, 6-12 monthly screening for T2DM
Inpatient protocols

- Refer to intranet protocol
- 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 about DKA in pregnancy?

- Occurs at lower blood glucose level
- Can present more rapidly than in non-pregnant women
- Insulin resistance (esp 2\textsuperscript{nd}/3\textsuperscript{rd} trimester)
- Accelerated starvation (esp 2\textsuperscript{nd}/3\textsuperscript{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%)
- Maternal mortality less of a concern (CEMACE 2006-2008 data)

- Mechanisms of fetal loss
  - Fetal acidosis and electrolyte disturbance Decreased placental blood flow (osmotic diuresis and volume depletion)
  - Fetal hypokalaemia leading to myocardial suppression or arrhythmias
  - 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\(\geq10mM\)
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
- **Call us!**
Useful resources

- A-Z
  - Reproductive Medicine
    - Antenatal policies and guidelines
      - Diabetes in Pregnancy (has a DKA section)
    - Metabolic Unit Handbook
      - Diabetes in pregnancy (being aligned with above)
  - Diabetes
    - Inpatient resources
      - CSII insulin pump guide
  - CAA
    - DKA protocol
Summary

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