

Diabetes in Pregnancy Registrar Induction

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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)

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	

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 $>5.5\text{mmol/L}$ $>2\text{hrs}$ after food, or $>7\text{mmol/L}$ $<2\text{hrs}$ after food, arrange OGTT

Diagnosis of GDM

- 75g OGTT:
 - Fasting glucose $\geq 5.1\text{mM}$
 - 2 hour $\geq 8.5\text{mM}$
- women in early pregnancy with levels of...
 - HbA1c $\geq 6.5\%$ (48 mmol/mol)
 - fasting glucose $\geq 7.0\text{ mmol/l}$
 - two hour glucose $\geq 11.1\text{ mmol/l}$
 - ...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 $\geq 7\text{mM}$ 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 2nd/3rd trimester)
- Accelerated starvation (esp 2nd/3rd 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 2nd/3rd trimester
- Check ketones in pregnant patients who are vomiting or have $\text{BM} \geq 10\text{mM}$

How to diagnose it?

- Hyperglycaemia ($> 10\text{mM}$)
- 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 PO₄)
 - 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)
 - <http://intranet.lothian.scot.nhs.uk/NHSLothian/Healthcare/A-Z/ReproductiveMedicine>
 - ❖ PoliciesAndGuidelines/Documents/MaternityPanLothian/Antenatal/DiabetesandPregnancy2003-13.pdf
 - 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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