

Diabetes in obstetric patients

Swedish Society of Obstetric Anaesthesia & Intensive Care

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Outline

- Scope of the problem
- Diabetes and drugs
- DKA and pregnancy
- Diabetes and steroids
- Intrapartum management glucose monitoring
- Take home messages

St Vincent's Declaration

- Diabetes Mellitus in Europe:
- A problem at all ages and in all countries

- A Model for Prevention and Self Care
- Saint Vincent (Italy), 10-12 October 1989

- ***Pledge for pregnancy outcome in the diabetic woman that approximates that of the non-diabetic woman***

St Vincent's Declaration

- Diabetes Mellitus in Europe:
- A problem that is increasing in all countries

NOT

- A Model for Prevention and Self Care
- Saint Vincent (Italy), 10-12 October 1989

- *Pledge for pregnancy outcome in the diabetic woman that approximates that of the non-diabetic woman*

REACHED

What is the problem?

- Globally, the burden of hyperglycemia during pregnancy is estimated to be 170 cases per 1000 live births
- Increasing global prevalence of obesity and type 2 diabetes mellitus

Challenges involved with:

- Glycaemic control
- Complications such as hyperglycaemia and hypoglycaemia
- Other comorbidities

Pre-existing diabetes mellitus (Type 1 and Type 2)

Risk of	Women on insulin (833)	Women not on insulin (311)
Miscarriage (%)	13.3	21.9
Stillbirth (%)	1.7	1.6
Congenital anomaly (%)	9.6	1.9
More likely to be	Type 1/poor control	

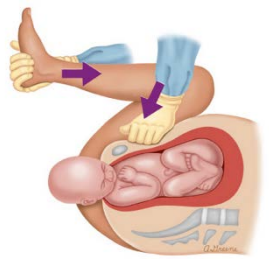
Compared to women with DMT1 those with DMT2 had a higher risk of :

- Miscarriages (20.5% vs 12.8%)
- Lower prevalence of malformations (4.0% vs 9.2%)

Table 3 – Country-level estimates of hyperglycaemia in pregnancy for countries with selected data sources.

IDF Region	Country/territory	Live births in women (20–49 years) (1000s)	Cases (1000s)	Crude prevalence (%)	Age-standardised prevalence (%)	Proportion of cases that may be due to total diabetes in pregnancy (%)
AFR	Nigeria	6156.3	1057.4	17.2	14.4	19.4
EUR	Belgium	127.3	8.0	6.3	5.0	21.4
	France	779.5	105.7	13.6	11.6	6.1
	Hungary	94.4	13.7	14.5	12.2	6.1
	Ireland	70.8	9.5	13.5	11.0	9.3
	Israel	155.0	19.6	12.6	10.5	4.1
	Netherlands	175.0	54.6	31.2	27.2	3.3
	Norway	61.0	19.7	32.3	31.1	4.3
	Poland	401.3	42.7	10.7	9.1	8.3
	Spain	478.4	175.7	36.7	32.1	2.5
	Turkey	1172.6	160.2	13.7	10.8	31.7
United Kingdom	719.5	164.3	22.8	19.8	5.1	
MENA	Islamic Republic of Iran	1387.6	264.8	19.1	16.9	16.0
	Qatar	24.2	8.0	33.2	25.4	31.3
	United Arab Emirates	134.4	54.3	40.4	36.8	16.2
NAC	Barbados	3.2	0.6	20.3	15.4	15.9
	Canada	380.1	67.5	17.8	15.4	11.5
	Trinidad and Tobago	18.0	1.7	9.2	6.9	31.7
	United States of America	3894.3	464.2	11.9	8.5	32.7
SACA	Argentina	607.6	56.8	9.4	7.9	17.6
	Brazil	2429.9	280.7	11.6	9.7	21.7

What are the Risks?



- **Maternal**
- Polyhydramnios
- Postpartum Haemorrhage
- Perineal Trauma
- Infection
- Poor wound healing
- Ketosis / DKA
- Severe Hypoglycaemia
- Weight gain
- Worsening micro & macrovascular disease
- Long term cardiovascular risks

- **Congenital Malformations**
- Cardiac and Neural Tube Defects 2-6x
- **Neonatal**
- Stillbirth 4-5x
- Preterm delivery 4-6x
- Macrosomia
- Birth trauma / Shoulder dystocia
- Respiratory Distress Syndrome (surfactant)
- Jaundice 2x
- Neonatal Hypoglycaemia



Challenges we face

- Type 1 DM are more likely to be on insulin pumps-more gadgets
- Type 2 DM have more co-morbidities
- GDM population increasing
- Comorbidities-ACS/hypertension and microvascular complications of diabetes
- Risks in:
 - Early loss/congenital anomalies
 - Hyperglycaemia/Hypoglycaemia/Diabetic Ketoacidosis
 - Superimposed PET

Glycaemic control overview

Insulin requirements go up during pregnancy

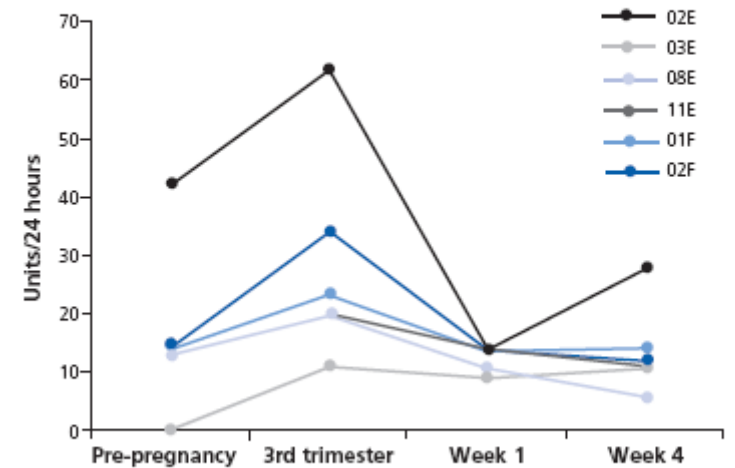
Insulin resistance increases in 2-3rd T

Pregnancy is a ketosis prone state – watch carefully for DKA, especially in hyperemesis

Insulin requirements return to near normal immediately post pregnancy

Breast Feeding can cause hypoglycaemia

Figure 1. Basal insulin doses from pre-pregnancy to end of study period



Our Diabetic Women on labour ward

- What drugs are they on usually:

- Folic acid
- Aspirin
- Metformin
- Insulin Analogues
 - Novarapid/Humalog
 - Levemir/Glargine
- Calcium/vitamin D

- Other Drugs

- Anti-hypertensives
- Other autoimmune disease Mx
- Anti-emetics
- PPI

Continuous glucose monitoring in pregnant women with type 1 diabetes (CONCEPTT): a multicentre international randomised controlled trial



*Denice S Feig, Lois E Donovan, Rosa Corcoy, Kellie E Murphy, Stephanie A Amiel, Katharine F Hunt, Elisabeth Asztalos, Jon FR Barrett, J Johanna Sanchez, Alberto De Leiva, Moshe Hod, Lois Jovanovic, Erin Keely, Ruth McManus, Eileen K Hutton, Claire L Meek, Zoe A Stewart, Tim Wysocki, Robert O'Brien, Katrina Ruedy, Craig Kollman, George Tomlinson, and Helen R Murphy, on behalf of the CONCEPTT Collaborative Group**

Summary

Background Pregnant women with type 1 diabetes are a high-risk population who are recommended to strive for optimal glucose control, but neonatal outcomes attributed to maternal hyperglycaemia remain suboptimal. Our aim was to examine the effectiveness of continuous glucose monitoring (CGM) on maternal glucose control and obstetric and neonatal health outcomes.

Methods In this multicentre, open-label, randomised controlled trial, we recruited women aged 18–40 years with type 1 diabetes for a minimum of 12 months who were receiving intensive insulin therapy. Participants were pregnant (≤ 13 weeks and 6 days' gestation) or planning pregnancy from 31 hospitals in Canada, England, Scotland, Spain, Italy, Ireland, and the USA. We ran two trials in parallel for pregnant participants and for participants planning pregnancy. In both trials, participants were randomly assigned to either CGM in addition to capillary glucose monitoring or

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Continuous glucose monitor

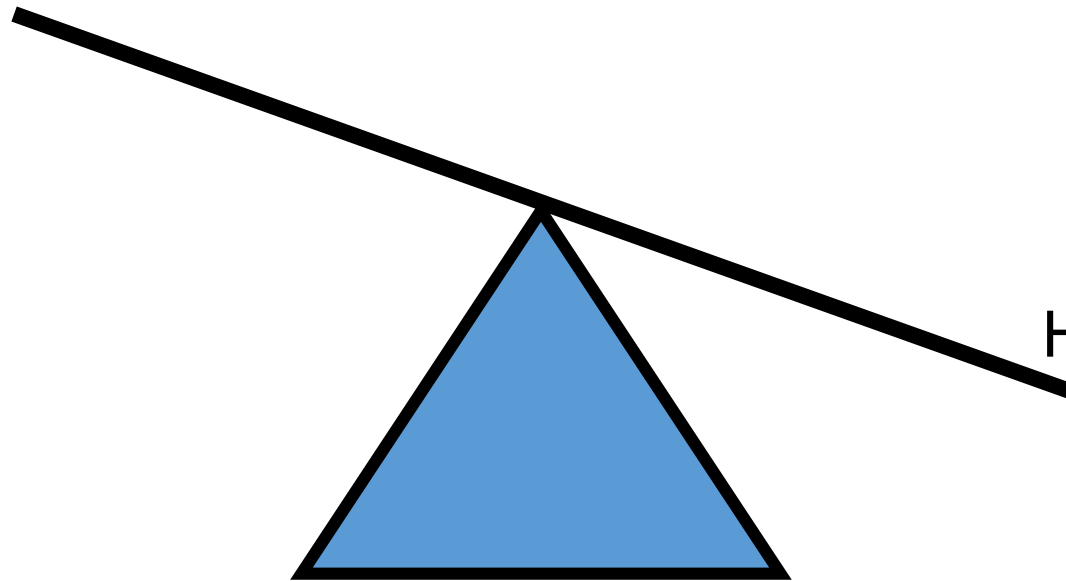


CONCEPTT Summary

- Pregnant women using CGM had lower HbA1c and better day-to-day glucose levels (100 mins/day)
- GCM effects were comparable among insulin pump and MDI users and across 31 international sites
- We found no consistent benefit of CGM in women planning pregnancy
- Babies of mothers using CGM had reduced risk of
 - Large for gestational age, NICU admissions > 24 hours, Neonatal hypoglycaemia requiring iv dextrose, 1 day shorter hospital stay
- The NNT were very low (6-8) with potential for cost savings

Other Medical problems encountered?

Hyperglycaemia
Diabetic Ketoacidosis



Hypoglycaemia

Women with long-standing diabetes mellitus are at increased risk of severe hypoglycaemia and diabetic ketoacidosis.

The other four women had long-standing T1DM and were managed in joint antenatal diabetic clinics. Two died of ketoacidosis, one drowned as a result of likely hypoglycaemia and one died suddenly of presumed, 'diabetic dead in bed' syndrome. Comments in the notes indicated that all four women had poor control prior to conception and during pregnancy.

One woman with a strong family history of autoimmune disorders developed Addison's disease a few weeks after delivery. She presented with hypoglycaemia and hyponatraemia and was well managed. She had been advised about increasing her insulin dose if she increased glucocorticoids in the context of intercurrent infections. She developed diabetic ketoacidosis some months after delivery. Her care appeared to be excellent and this death emphasises how rapidly women with ketoacidosis can deteriorate. The recent diagnosis of Addison's disease and the need for glucocorticoid treatment may have increased her susceptibility to hyperglycaemia and associated ketosis.

The woman that drowned, probably due to hypoglycaemia, had suffered several episodes of hypoglycaemia throughout the first trimester and it was not clear whether she had been advised about the risks of bathing alone. This death underlies the importance of emphasising the risks of hypoglycaemia to women with T1DM (CEMACH 2005).

Maternal, Newborn and
Infant Clinical Outcome
Review Programme



Saving Lives, Improving Mothers' Care
Lessons learned to inform future maternity care
from the UK and Ireland Confidential Enquiries into
Maternal Deaths and Morbidity 2009-2012



Hypoglycaemia

- Common in first trimester
- CEMACH study
 - 61% type 1 DM had recurrent hypoglycaemia
 - 25% type 1 DM required 3rd party help
- No evidence of teratogenicity

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FreeStyle Libre and Dexcom G4 Platinum sensors: Accuracy comparisons during two weeks of home use and use during experimentally induced glucose excursions

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The FreeStyle Libre system is clinically proven to be accurate and safe for use during pregnancy⁶

Diabetes in pregnancy is common.

Approximately 7.5% of all pregnant women have type 1 or type 2 diabetes, and one in seven pregnant women will develop gestational diabetes⁵.

Pregnant women with type 1, type 2 or gestational diabetes are recommended to monitor frequently to help maintain good blood glucose control throughout pregnancy and reduce the risk of adverse outcomes⁶.

With the FreeStyle Libre system, pregnant women can check their glucose without routine finger pricks¹.



Case

Aged 22 P0 16/40 gestation

Hyperemesis and has type 1 diabetes mellitus

On an insulin pump

4+ ketones urianlysis

Blood glucose 15mmol/L

What would you do next?

Diabetic Ketoacidosis and Pregnancy

- Incidence 1-3% during pregnancy
- Fetal loss remains at 9-25%
- During pregnancy there is accelerated starvation predisposing to DKA

- Lower blood glucose levels at time of presentation
- serum bicarbonate < 18 mg/dL
- pH < 7.30
- Venous blood gas base excess of < -4

Diabetic Ketoacidosis and Pregnancy

- Poor compliance with prescribed medications,
- Hyperemesis
- Develop more rapidly with insulin pumps because of battery failure or infection at the site of infusion

- Lower blood glucose levels at time of presentation
- serum bicarbonate < 18 mg/dL
- pH < 7.30
- Venous blood gas base excess of < -4

Management

- Prompt management-use local guidelines
- Fluid resuscitation-approximately 75% of total fluid replacement to be replenished in first 24 hours
- Aim to stabilise the mother before decision to deliver

Lung maturation with high dose steroids-what is the risk to the diabetic mother?

- Risk of diabetic ketoacidosis
- Risk of severe dysregulation of metabolic control

Options

- An algorithm with an increasing insulin dose of up to 40% shortly after glucocorticoid treatment for fetal lung maturation
- Insulin Sliding scale
- Own Insulin Pump

Intrapartum Care-what is important?

- Glycaemic control and Hydration

The duration of intrapartum maternal hyperglycaemia predicts neonatal hypoglycaemia in women with pre-existing diabetes.

[Joshi T](#)^{1,2,3}, [Oldmeadow C](#)^{3,4}, [Attia J](#)^{2,3,4}, [Wynne K](#)^{1,2,3,4}.

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Abstract

AIM: There is a high incidence of neonatal hypoglycaemia in neonates born to mothers with pre-existing diabetes. This often necessitates admission to the neonatal intensive care. Guidelines suggest maintaining intrapartum blood glucose levels (BGLs) of 4-7 mmol/l in women with diabetes to reduce the risk of neonatal hypoglycaemia. This study assessed whether intrapartum BGLs in women with pre-gestational Type 1 and 2 diabetes were predictive of neonatal hypoglycaemia.

CONCLUSIONS: These data support a BGL range of 4-7 mmol/l as an intrapartum target. Glycaemic control in the second trimester is associated with neonatal hypoglycaemia. Improvement in ante- and intrapartum glycaemic control may reduce neonatal hypoglycaemia in women with pre-existing diabetes.

Key Messages

- ‘Pregnancy is a road test for life’
- Diabetes in pregnancy is a big deal
- Get control of diabetes and its complications before pregnancy to avoid them rapidly worsening during pregnancy
- To have a successful pregnancy tight glucose control is essential, but do not increase the risk of hypoglycaemia
- Intrapartum Care in multifactorial
- MDT working is essential
- Pregnancy can predict later vascular and metabolic disease, and should be used as an opportunity to counsel and delay these by better health

- **Thank you for listening**

- **Questions?**