

# Evaluation of care processes and clinical outcomes in pregnancy complicated by diabetes

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## Introduction

- There has been a dramatic increase in workload in the diabetes in pregnancy clinic at the RVI over the last 10-15 years. Because of this the service has been reorganised to cope this to try and maintain level of care for women with the most challenging form of diabetes in pregnancy – type1.
- The primary aim of this project was to evaluate how well the service now delivers identifiable care processes.
- Secondary aim of this project was to evaluate outcomes between type 1, type 2 and gestational diabetes (GDM).
- Information on every pregnancy complicated by diabetes between 1/1/2010 and 1/1/2015 was collated.
- Maternal and neonatal outcomes were compared with existing data gathered 2000-2005<sup>1</sup>.
- Data from 283 pregnancies were obtained and analysed.

## Materials and methods

Electronic and paper notes were searched to collect pre-specified information. This information was organised in an Excel spreadsheet and statistical analysis was conducted to elicit patterns and trends. Students unpaired t-test was used to test statistical significance between groups.

## Results

Table 1 – Comparison of 2010-2015 outcomes with that of 2000-2005.

	Type 1 Diabetes			Type 2 Diabetes			GDM		
Years	2010-15	2000-05	P	2010-15	2000-05	P	2010-15	2000-05	P
Mean pregnancy HbA1C	56.2±12.7	53.6±12.3	0.03	45.13±8.8	51.2±12.8	0.001	39.3±5.8	43.5±10.8	0.005
Birthweight	3361.7±770.7	3493.2±688.2	0.15	3183±672.2	3491.4±647.6	0.08	3343.1±536.5	3539.6±562.6	0.02
Gestational age at delivery	38±1.65	37±1.59	0.26	37.2±1	37.1±1.37	0.63	38±2.9	37.8±1.49	0.64

### Comparison of 2005-05 and 2010-15

Table 1 shows the differences between the 2 time periods examined. Significant aspects to note are;

- There was a small but significant increase in HbA1c for type 1 diabetes. This was not sufficient to affect birthweight.
- Mean pregnancy HbA1C was significantly improved for both Type 2 Diabetes and GDM pregnancies. This was associated with lower birthweights in the GDM. Metformin drug therapy was introduced in 2006 and this could explain the observation.

### The population

The clinical characteristics of the women in each group are shown in Table 2.

- HbA1C is a measure of the glucose control during pregnancy. This was noticeably different in each group; highest in Type 1 at 56.2±12.7 and lowest in Gestational Diabetes (GDM) at 39.3±5.8.
- The difference in BMI between the Type 1 and 2 diabetics is striking, 26.2 and 32.3 kg/m<sup>2</sup> respectively.

### Maternal and neonatal outcomes

#### Delivery

- Gestational age at delivery was similar across the groups. This reflects the current induction guidelines<sup>2</sup>.
- Preterm delivery rates, defined as delivery before 37 weeks gestation were similar in the Type 1 and 2 groups but significantly lower in the mothers with Gestational Diabetes (GDM). The preterm delivery rates overall were decreased compared to previous years<sup>1</sup>.
- There were major differences in the mode of delivery between groups as shown in Figure 1. Emergency C-section and assisted delivery rates were much higher in the Type 1 group. Vaginal delivery rates were 3 fold higher in the GDM group compared with T1DM.

### Growth

- Birthweight was shown to be higher than in pregnancies not complicated by diabetes<sup>3</sup>.
- The intra-uterine growth rate differences between type 1, 2 and GDM were surprising in view of HbA1c, but similar to that seen in 2000-05.
- Rates of growth were examined closely. Fetal abdominal circumference is used as a measure of the babies' growth. As shown in Figure 2, the growth of the babies in all types of diabetes crosses to above the 50<sup>th</sup> centile, very early on in pregnancy.

Table 2 – Maternal characteristics 2010-2015

	Type 1	Type 2	GDM
Number of women	98	30	159
Maternal age (years)	31.7±6.2	36.7±4.9	35.2±5.2
Maternal BMI (kg/m <sup>2</sup> )	26.2±4.5	32.3±10	29.3±7
Mean HbA1c (mmol/mol)	56.2±12.7	45.13±8.8	39.3±5.8

Figure 1 - Mode of delivery by diagnosis 2010-15

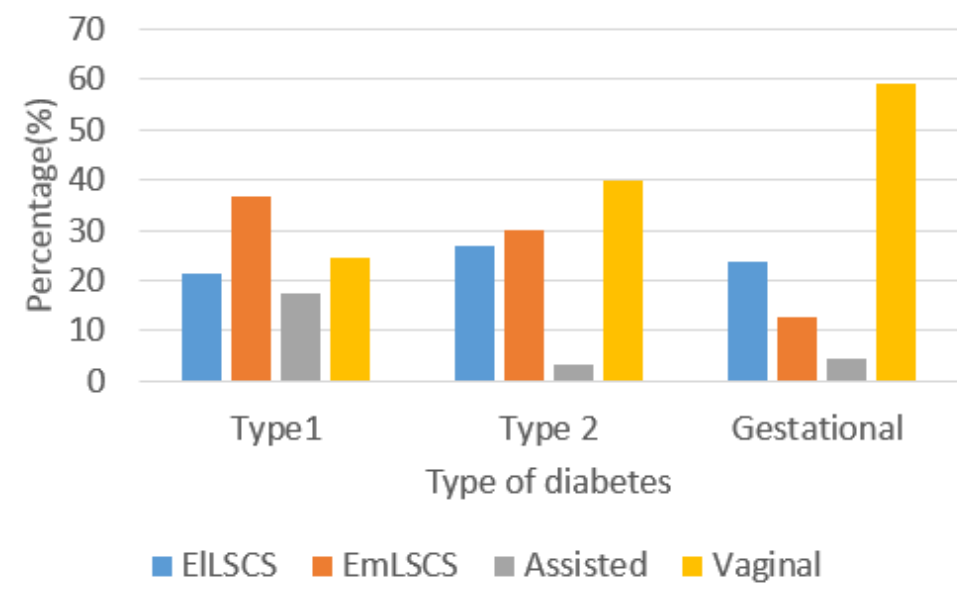
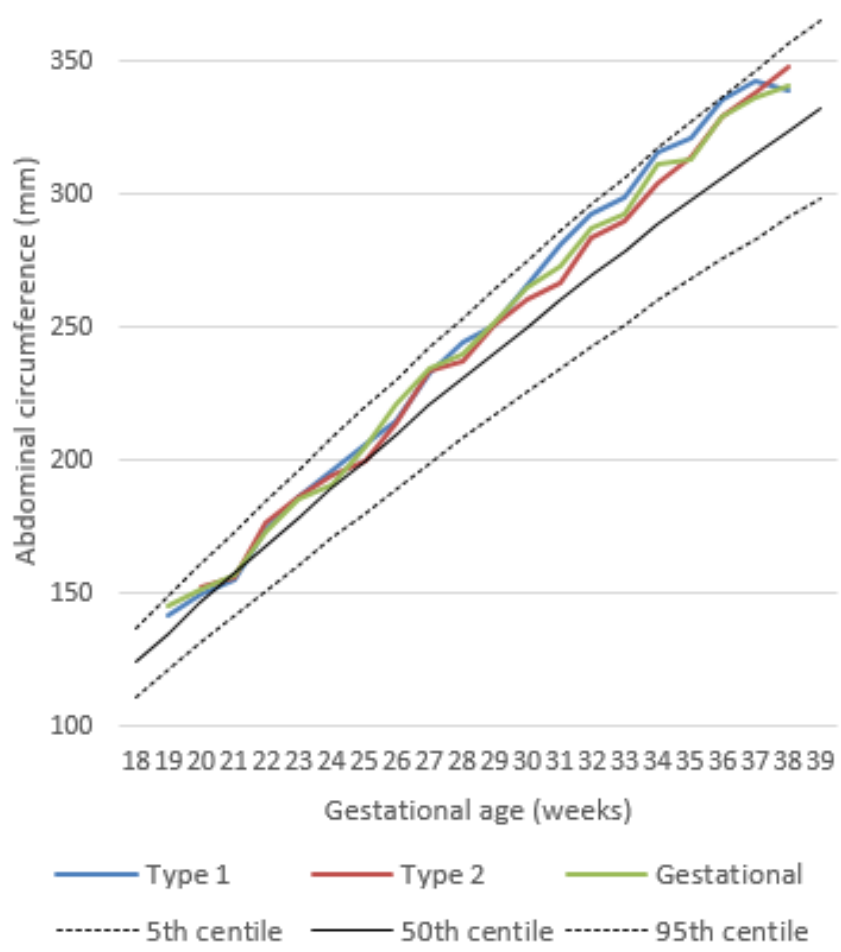


Figure 2- Abdominal circumference during pregnancy by diagnosis, 2010-15



## Conclusions

Firstly, this project has highlighted the slight but significant worsening of average blood glucose control in type 1 diabetes between the two study periods. This is of great concern and provides evidence that greater staff resources are required to maintain standards. In contrast, the control of women with type 2 and GDM improved.

Secondly, the differences between subtypes of diabetes in mode of delivery were quantified and the surprising observation that the rate of growth of baby in the womb was identical in women with GDM and type 1 diabetes was confirmed. Further work on the causes of macrosomia in diabetes is now required as it clearly does not relate solely to blood glucose control.

## Literature cited

- 1 - Lim, E.L. et al., (2009) 'Intrauterine growth rate in pregnancies complicated by type 1, type 2, and gestational diabetes' *Obstetric Medicine* 2 pp. 21-25 DOI: 10.1258/om.2008.080057.
- 2 - NICE (2015) *Antenatal care for women with diabetes* Available at: <http://pathways.nice.org.uk/pathways/diabetes-in-pregnancy/antenatal-care-for-women-with-diabetes#content=view-node:nodes-planning-birth> (Accessed: 30.09.2015)
- 3 - Chitty, L. S. et al. (1994) 'Charts of fetal size: 3. Abdominal measurements. *British Journal of Obstetrics and Gynaecology* 1994;101:125-31

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## Further information

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