

# Effects of Insulin Pump Use on Glycemic Control During Labour and Delivery in Type 1 Diabetes.

Z. Anna Liu MD<sup>1</sup>, Julia Lowe MBChB M.Med Sci (ClinEpi)<sup>1,2</sup>, Fiona Thompson-Hutchison APN MN PNC(c) CDE<sup>3</sup>, Daphna Steinberg RD CDE CDEP<sup>3</sup>, Ilana Halperin MD MSc<sup>1,2</sup>

1. Faculty of Medicine, University of Toronto 2. Department of Endocrinology, Sunnybrook Health Sciences Centre 3. Woman and Babies Program, Department of Obstetrics & Gynecology, Sunnybrook Health Sciences Centre, Toronto, Canada

## Introduction

- Insulin delivery for pregnant women with Type 1 diabetes include multiple daily injections (MDI) of subcutaneous insulin and insulin pump.
- Conventional insulin administration during labour and delivery (L&D) has been intravenous (IV) insulin.
- This study aims to evaluate the safety and efficacy of insulin pump therapy as guided by a pre-printed prescribing protocol during the intrapartum and postpartum periods (figure 1).

## Materials and Methods

### Study Design

- A retrospective cohort study of patients with Type 1 diabetes followed by Diabetes in Pregnancy Clinic between January 2011-December 2016.
- Maternal and neonatal outcomes, including peripartum capillary blood glucose measurements (48 hours pre- to 24 hours post- delivery) were compared between 3 groups: 1) MDI users switched to IV infusion during L&D (MDI), 2) insulin pump users switched to IV infusion during L&D (pump/IV), 3) insulin pump users continued on pump during L&D (pump/pump).

### Statistical analysis

- Mean and median blood glucose were compared between groups using Kruskal-Wallis test and Wilcoxon rank sum test, as appropriate.
- Binary outcomes were compared between groups using Fisher's exact test.

Figure 1. Intrapartum/postpartum insulin pump order set

## Results

- Of 71 eligible pregnancies, 42 (59%) had >4 documented peripartum blood glucose levels

Table 1. Sample Characteristics

Characteristic	MDI (n=22)	Pump/IV (n=11)	Pump/Pump (n=9)
Age, years - mean (SD)	33.1 (5.8)	31.8 (4.8)	30.0 (4.6)
Duration of Diabetes years - mean (SD)	13.1 (9.0)	12.9 (6.3)	17.3 (6.5)
Pregnancy Induced HTN - n (%)	9 (40.0)	3 <sup>^</sup> (33.3)	1 (11.1)
Preeclampsia - n (%)	3 (13.6)	3 <sup>^</sup> (33.3)	1 (11.1)
Third Term HbA1C, % - mean (SD)	7.1 (1.9)	6.6 (0.6)	6.8 (0.4)
Vaginal Delivery - n (%)	5 (22.7)	2 <sup>^</sup> (22.2)	2 (22.2)
C/S Section - n (%)	17 (77.3)	7 <sup>^</sup> (77.8)	6 (66.7)

\*P > 0.05 for all; <sup>^</sup> n = 9

Table 2. Maternal and fetal outcomes

Outcome	MDI (n=22)	Pump/IV (n=11)	Pump/Pump (n=9)
BG mean, mM - mean (SD)	6.7 (1.9)	6.0 (0.7)	6.7 (1.0)
BG median, mM - mean (SD)	6.3 (2.0)	5.6 (1.3)	6.4 (1.1)
BG values between 3.8-6.6 mM, % - mean (SD)	45.1 (24.7)	44.5 (5.7)	46.9 (26.1)
BG values below 3.8 mM, % - mean (SD)	12.6 (15.7)	18.0 (4.2)	14.0 (11.5)
Mother never hypoglycemic - n (%)	9 (41.0)	2 (18.2)	3 (33.3)
Neonatal Hypoglycemia (BG <2.6) - n (%)	7 (53.8) (n = 13)	4 (44.4) (n = 9)	4 (66.7) (n = 6)
Macrosomia (>4000g) - n (%)	5 (22.7)	1 (16.7) (n = 6)	5 (62.5) (n = 8)

\*P > 0.05 for all

## Conclusions

- Previous studies have shown the use of insulin pump intrapartum resulted in improved maternal glycemic control.<sup>1,2</sup>
- Results from this study were not significant due to small sample sizes and low numbers of intrapartum glucose values.
- Future studies at our site will assess:
  - patient experience continuing on insulin pump
  - immediate postpartum glycemic control before and after implementation of intrapartum/postpartum order sets

## References

1. Drever E, Tomlinson G, Bai AD, Feig DS. Insulin pump use compared with intravenous insulin during labour and delivery: the INSPIRED observational cohort study. *Diabet Med.* 2016 Sep;33(9):1253-9.
2. Fresa R, Visalli N, Di Blasi V, et al. Experiences of continuous subcutaneous insulin infusion in pregnant women with type 1 diabetes during delivery from four Italian centers: a retrospective observational study. *Diabetes Technology & Therapeutics* 2013 Apr;15(4):328-334.