267 Treating patients in HAPO glucose category 4 to improve maternal and neonatal outcomes: a cost effectiveness analysis

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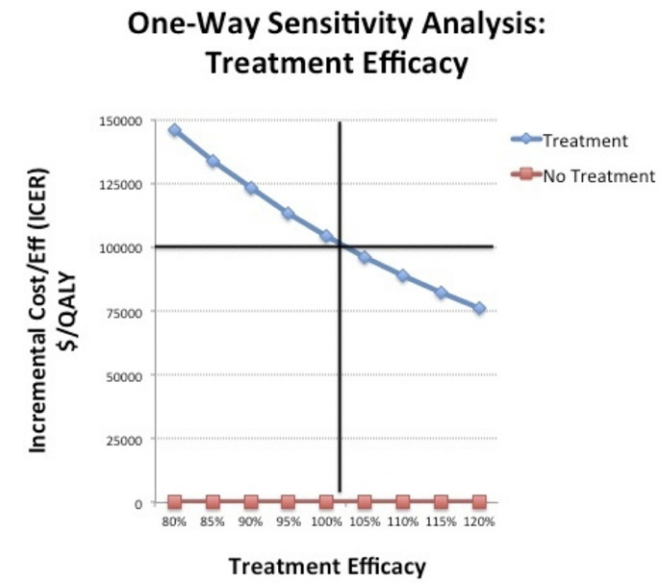
OBJECTIVE: The HAPO study demonstrated a linear relationship between maternal hyperglycemia and adverse pregnancy outcomes. Subjects were divided into seven categories according to fasting glucose levels, with Category 4 representing patients with glycemic levels in the top 12-23%, representing patients just below the cutoff for gestational diabetes (GDM) under the new IADPSG guidelines. This study examines the cost-effectiveness of treating patients in HAPO Category 4 for GDM, accounting for the costs and benefits of treating hyperglycemia in pregnancy.

STUDY DESIGN: A decision analytic model was built using TreeAge software that compared treatment vs. no treatment for patients in HAPO Category 4. Outcomes included preeclampsia, mode of delivery, maternal death, macrosomia, shoulder dystocia, brachial plexus injury (permanent and transient), hypoglycemia, hyperbilirubinemia, and neonatal death. Existing randomized controlled trials were used to estimate the effect of treatment on outcomes. Utilities were applied to discounted life expectancy at a discount rate of 3% to generate QALYs. In addition, an index adjusting for treatment efficacy was used for sensitivity analysis. The cost-effectiveness threshold was set to $100,000 per QALY.

RESULTS: Treating patients in HAPO Glucose Category 4 was more effective (56.914280 QALYs with treatment vs 56.903297 without treatment) but more expensive ($12,660.70 with treatment vs $11,514.91 without treatment), with an incremental cost of $104,323.96/QALY. In a one-way sensitivity analysis of the effect of treatment on outcomes, treatment must exceed 102.6% of its expected effect for treating HAPO Group 4 to become cost-effective.

CONCLUSION: Treating patients in Category 4 of the HAPO Study for GDM is not cost-effective. Further studies to investigate other methods of improving perinatal outcomes in this group are warranted.



One-way sensitivity analysis of GDM treatment efficacy versus incremental cost-effectiveness ratio. For treatment to remain cost effective, treatment must exceed 102.6% of its expected effect in improving perinatal outcomes.

268 The impact of gestational change in body mass index (BMI) on adverse pregnancy outcomes among women with gestational diabetes

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OBJECTIVE: Previous studies have shown that women who have minimal to no weight gain have a higher incidence of gestational diabetes (GDM). This is likely an example of reverse causality resulting from dietary counseling once the diagnosis of GDM is made. In general, weight restriction is not advocated in pregnancy. However, given that better dietary intake among gestational diabetics may result in weight loss, its impact on adverse pregnancy outcomes warrants investigation.

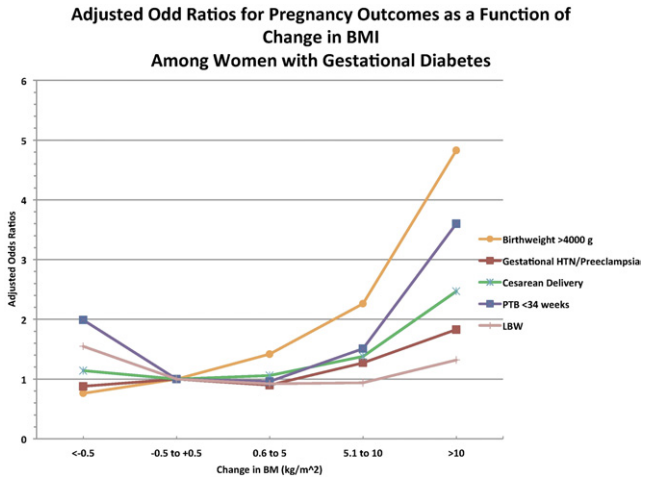
STUDY DESIGN: This is a retrospective cohort study using linked birth certificate and discharge diagnosis data (All-California, Rapid-Cycle, Maternal/Infant Database) from the year 2007. Inclusion criteria: singleton gestation, GDM, known prepregnancy BMI and gestational weight gain. Subjects were divided into categories based on change in pregnancy BMI: BMI loss (<-0.5), no change (-0.5 to 0.5), minimal (0.6 to 5), moderate (5.1 to 10), excessive (>10). Odds ratios (OR) and 95% confidence intervals (CI) for adverse pregnancy outcomes were calculated. No change in pregnancy BMI served as the reference group.

RESULTS: There were 28,534 women in the study. While the odds of gestational hypertension and preeclampsia were only increased among gestational diabetics with excessive BMI change (aOR, 1.83; 95% CI, 1.33-2.51), cesarean delivery was increased in those with both moderate (aOR, 1.39; 95% CI, 1.19-1.61) and excessive BMI change (aOR, 2.47; 95% CI, 2.02-3.02). Birthweight >4000g was increased with any positive change in BMI: minimal (aOR 1.42; 95% CI, 1.09-1.85), moderate (aOR 2.26; 95% CI, 1.73-2.95), excessive (aOR, 4.83; 95% CI, 3.57-6.54). When accounting for shorter duration of pregnancy among those with premature births, the odds of preterm delivery and low birthweight were as high or higher in women with excessive BMI gain as they were among women with BMI loss.

CONCLUSION: Weight restriction among gestational diabetics may not be harmful and may improve outcomes among this cohort of women.

Unadjusted incidence of adverse pregnancy outcomes as a function of change in pregnancy body mass index

	BMI Loss	No Change	Minimal Change	Moderate Change	Excessive Change	P-Value
GHTN/Preeclampsia	7.5%	8.7%	7.7%	10.8%	15.6%	<0.001
PTB<34 wks	4.6%	2.3%	2.2%	3.2%	7.1%	<0.001
Cesarean Delivery	42.6%	39.3%	39.9%	45.3%	58.8%	<0.001
BW>4000g	6.4%	7.9%	10.2%	14.4%	27.7%	<0.001
BW<2500g	9.1%	6.2%	5.8%	6.0%	8.0%	<0.001



269 Delivery outcomes of large for gestational age (LGA) infants of diabetic mothers (IDMs)

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OBJECTIVE: To evaluate delivery outcomes of LGA infants of IDMs.

STUDY DESIGN: Observational study (2008-11) of all LGA infants (birthweight >90th% for GA) delivered to 144 mothers with pregestational diabetes (PGDM) and 157 mothers with GDM. Major malformations and GA <34 w pts were excluded. Primary outcome of interest was shoulder dystocia (SD) and associated morbidity.

RESULTS: A total of 301 births were identified. 104 women (34.6%) delivered via repeat cesarean delivery (CD) while 106 (35.2%) women underwent a primary CD (67 for macrosomia, 13 for FTP, 8 for breech presentation, 10 for nonreassuring fetal heart rate status, 8 other). A total of 91 women (30.2%) delivered vaginally, with 20 cases complicated by shoulder dystocia (22% of vaginal deliveries). No cases of brachial plexus injury or humeral/clavicular fracture occurred. Other neonatal morbidities included RDS/TTNB (55%), late preterm birth (35% of PGDMs and 24% of GDMs), 5 minute Apgar <6 (9 patients, 2 with severe depression), and neonatal hypoglycemia (Glc values <40 mg/dl, affected 68 pts once and 49 others at least twice). NICU admission occurred in 81% of PGDMs and 35% of GDMs, but 75% of these admissions were <48 hours in duration, usually for the indication of blood sugar monitoring.

CONCLUSION: We confirm a high frequency of SD in LGA IDMs delivered vaginally. Despite selection of a high proportion of cases for primary CD, SD occurred in 22% of all vaginal deliveries. A liberal approach to CD with suspected macrosomia in diabetic pregnancy cannot prevent all cases of SD in this high risk population.

	34-36 w	37 w	38 w	39 w	40 w	Total
Number	88	78	74	49	12	301
% GDM	43%	35%	53%	84%	100%	51%
IOL (#)	28	22	17	18	4	89 (30%)
Vag del (#)	35	18	16	17	5	91 (30%)
Primary CD (#)	29	31	29	14	3	106 (35%)
Shoulder Dystocia (#)	4	7	3	4	2	20 (22%)
Mean Birthweight (g)	3543	4062	4221	4289	4223	

270 Effects of maternal hyperglycemia on placental vascular responsiveness

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OBJECTIVE: Hyperglycemia has been shown to impact the body's ability to regulate blood supply via excess uptake of endogenously produced nitric oxide. Lacking any neural stimulus, fetal-placental vascular tone is regulated via autocrine mechanisms, specifically vascular production of nitric oxide. We sought to investigate the effects of maternal hyperglycemia on the placenta's ability to self regulate its blood flow.

STUDY DESIGN: Using the placental perfusion model, 15 unlabored placentas at term were analyzed. Vascular responsiveness, as measured by pressure change from baseline, was recorded following serial injections of L-NAME, a nitric oxide inhibitor, into the fetal circulation. Dextrose was then added to the circulatory bath at a concentration of 8×10^{-3} M, and serial injections of L-NAME were again administered; pressure change from baseline was again recorded. The pressure changes between the normoglycemic and hyperglycemic placentas were compared at each concentration of L-NAME. The data was analyzed using the Mann-Whitney U test.

RESULTS: Fetal vascular responsiveness, as measured by the change in pressure, was diminished in 10/15 placentas at an L-NAME concentration of 10^{-3} M, 7/15 at 10^{-4} M, 9/14 at 10^{-5} M, and 6/15 at 10^{-6} M. There was a significant difference in the change in pressure in the normoglycemic placenta vs. the hyperglycemic placenta after injection of L-NAME at 10^{-5} and 10^{-3} concentrations.

CONCLUSION: In an in vitro placental perfusion model, placental hyperglycemia appears to reduce the nitric oxide inhibition effects of L-NAME, reaching statistical significance at 10^{-5} and 10^{-3}.

L-NAME Concentration	Normoglycemia (median ΔmmHg)	Hyperglycemia (median ΔmmHg)	p
10^{-6}	25.0 (20.2 - 31.0)	30.0 (18.0 - 42.0)	0.23
10^{-5}	29.0 (20.6 -33.1)	24.0 (16.0 - 30.8)	0.001
10^{-4}	26.0 (18.3 -30.0)	26.0 (17.0 - 36.3)	0.57
10^{-3}	24.0 (20.0 - 30.0)	20.0 (11.2 - 26.0)	0.01

271 The effect of metformin on insulin requirements in pregnancies complicated by type 2 diabetes

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OBJECTIVE: To investigate the effect of metformin on gestational insulin requirements in pregnancies complicated by type 2 diabetes (T2DM) in obese and non-obese populations.

STUDY DESIGN: A retrospective cohort study was performed on women with singleton term pregnancies with T2DM enrolled in the U.C. San Diego Diabetes and Pregnancy program from February 2008 to October 2011. Exclusion criteria included use of sulfonylureas, delivery at outside institutions, or insufficient prenatal care. Comparisons of patients using insulin alone versus those on insulin/metformin therapy were made using the t-test for continuous variables and the chi-squared or fisher's exact tests for categorical variables.

RESULTS: A total of 69 women met inclusion criteria, 40 in the insulin-only cohort and 19 in the insulin/metformin cohort. Demographic variables, including age, ethnicity, parity, initial BMI and HbA1c were not significantly different between the two groups. 75% of patients in the insulin-only cohort and 53% in the insulin/metformin cohort were obese in the first trimester. In the obese population, patients on metformin had significantly higher total and short-acting insulin requirements at 36 weeks compared to the insulin-only cohort (table 1). In the non-obese population, there were no significant differences in insulin requirements between the metformin/insulin and insulin-only cohorts. Gestational age at delivery, infant birthweight, frequency of macrosomia, mode of delivery, and Apgar scores were similar in both groups.