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Gestational Age of Delivery in Pregnancies Complicated by Chronic Hypertension

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Abstract

Objective—To identify the gestational age of planned delivery in pregnancies complicated by chronic hypertension that minimizes the risk of perinatal death and severe adverse events.

Methods—This was a retrospective cohort study of all singletons complicated by hypertension. Detailed patient-level information was collected by chart review, including indication for delivery. Planned delivery at 36–36.6, 37–37.6, 38–38.6, and 39–39.6 weeks was compared to expectant management beyond each respective gestational age. Patients were excluded for fetal anomalies, inaccurate dating, and major medical problems other than hypertension, diabetes or renal disease. The primary outcome was a composite of stillbirth, neonatal death, assisted ventilation, cord pH<7.0, 5-minute Apgar ≤ 3 , and neonatal seizures. Secondary outcomes were preeclampsia, severe preeclampsia, primary cesarean, and infant length of stay >5 days. Groups were compared using Student's t-test and χ^2 tests.

Results—Six hundred eighty three women with hypertension reached 36 weeks. Patients with planned delivery <39 weeks were more likely to have baseline renal disease. Prior to 37 weeks, planned delivery was associated with a statistically significant increase in the primary composite adverse neonatal outcome (10.0% versus 2.6%, $p=0.04$); after 38 weeks, expectant management was associated with a non-statistically significant increase in the primary composite outcome (0% versus 2.3%, $p=0.40$). Expectant management beyond 39 weeks was associated with a statistically significant increase in severe preeclampsia (0 versus 10.3%, $p=0.001$).

Conclusion—Expectant management beyond 39.0 weeks was associated with increasing incidence of severe preeclampsia; planned delivery prior to 37 weeks was associated with an increase in adverse neonatal outcomes. Further, well-powered studies are needed to delineate the optimal gestational age of delivery.

Chronic hypertension complicates up to 5% of pregnancies in the United States; this number is expected to increase both due to the trend of increasing age at childbearing as well as increasing obesity in women of reproductive age.(1) Pregnancies complicated by chronic

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hypertension are at a twofold to threefold increased risk of stillbirth compared to pregnancies not complicated by hypertension; at term the risk of stillbirth in pregnancies complicated by chronic hypertension is 2–6 fetal deaths per 1,000 live births.(2–5) Concerns regarding the risk of stillbirth at term must be balanced regarding the risk of neonatal and infant death and morbidities with delivery prior to 39 weeks.(6, 7)

The American College of Obstetricians and Gynecologists, the Society for Maternal-Fetal Medicine, and the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development provide a broad range of gestational ages at which it might be appropriate to deliver pregnancies complicated by chronic hypertension, anywhere from 36–39 weeks of gestation.(8, 9) These recommendations are based on limited or inconsistent evidence. We sought to define an optimal gestational age of delivery to minimize perinatal morbidity and mortality.

Materials and Methods

We performed a retrospective cohort study of all singleton pregnancies delivered at the University of Alabama at Birmingham with a diagnosis of chronic hypertension from January 1, 2000-June 1, 2014. Institutional review board approval was obtained.

Patients were identified by a diagnosis of chronic hypertension as listed as a diagnosis in the electronic prenatal records. A diagnosis of chronic hypertension was confirmed by chart review with a self-reported history of chronic hypertension (based on patient report of *current* diagnosis of chronic hypertension), use of antihypertensives, or documented blood pressures ≥ 140 mm Hg systolic or ≥ 90 mm Hg diastolic on at least 2 occasions (separate days) prior to 20 weeks of gestation. Standardized chart abstraction forms were used to abstract data from the medical charts by physicians and medical students trained in chart abstraction. Data collected included detailed information on maternal demographics, medical and obstetrical history, prenatal blood pressures and urinalysis, baseline laboratory information, medication use, labor and delivery events, and neonatal outcomes. All women were managed by institutional protocol under the supervision of maternal-fetal medicine specialists, with target blood pressures $<150/90$ mm Hg. Serial fetal growth was followed after 28 weeks gestation, and at least weekly antenatal testing was performed with either contraction stress tests or biophysical profiles after 32–34 weeks. More frequent testing (twice weekly) was left to the discretion of the provider based on unique clinical scenarios.

Women with a live singleton gestation reaching 36 weeks and the diagnosis of chronic hypertension were included in the study. Women were excluded for major maternal medical illnesses other than hypertension, diabetes, or renal disease. Women with diabetes were included as this is a frequent co-morbidity of chronic hypertension and the clinical scenario of both chronic hypertension and diabetes is encountered frequently in clinical practice. Baseline renal disease was defined as urinary excretion of ≥ 300 mg of protein in a 24-hour period or a serum creatinine ≥ 1.2 mg/dL documented prior to 20 weeks gestation. Women were excluded if the pregnancies were complicated by fetal anomalies or if prenatal care was initiated after 20 completed weeks gestation. Only the first pregnancy meeting inclusion criteria during the study period was included in the analysis.

The primary outcome of the study was a composite adverse perinatal outcome of stillbirth, neonatal death, assisted ventilation (defined as receiving continuous positive airway pressure or mechanical ventilation), umbilical cord pH < 7.0, 5-minute Apgar \leq 3, and neonatal seizures. Secondary outcomes considered were preeclampsia, preeclampsia with severe features, primary cesarean delivery, and infant length of stay >5 days. Preeclampsia diagnosis was based on objective information obtained from the chart review and was defined as blood pressures \geq 140/90 mm Hg with either documented proteinuria or serum laboratory abnormalities. Proteinuria was based on a urine protein to creatinine ratio \geq 0.3 or urinary excretion of \geq 300 mg of protein in 24-hours. Serum laboratory abnormalities were defined as platelets <100,000/mL, AST >80 mU/mL (twice the reference laboratory value), or creatinine \geq 1.2 mg/dL. Preeclampsia with severe features was defined as blood pressure \geq 160/110 mm Hg or the presence of serum laboratory abnormalities. As patient symptoms were not consistently documented over the study period, these could not be considered in the definition.

In order to determine the gestational age of delivery that minimized perinatal morbidity, planned delivery was compared to expectant management at 36^{0/7}-36^{6/7}, 37^{0/7}-37^{6/7}, 38^{0/7}-38^{6/7}, 39^{0/7}-39^{6/7} weeks. Planned delivery was defined as either induction or scheduled cesarean for the indications of chronic hypertension, documented fetal lung maturity, prior stillbirth, gestational age, or elective. Expectant management was defined as delivery outside of the gestational age window or medically or obstetrically indicated delivery in the gestational age window. Medically or obstetrically indicated delivery included spontaneous labor, spontaneous rupture of membranes, vaginal bleeding, uncontrolled hypertension without proteinuria, preeclampsia or eclampsia, stillbirth, non-reassuring fetal testing, or oligohydramnios. Indicated deliveries were included in the expectant management group because development of a complication (such as abruption, non-reassuring fetal testing, preeclampsia) or labor is a consequence of expectant management. A secondary analysis was performed comparing outcomes with any planned delivery prior to 39 weeks and any planned delivery at or after 39 weeks.

Baseline characteristics of the planned delivery group and expectant management groups were compared with descriptive and univariable statistics using Student's t-test and chi-squared tests, as appropriate. Normal distribution of continuous variables was assessed visually with histograms and with the Kolmogorov-Smirnov test. The incidence of outcomes between the exposed and unexposed groups was compared using the chi-squared test or Fisher's exact test as appropriate. All analyses were performed using Stata SE, version 13 (College Station, TX). Statistical significance was considered to be a $p < 0.05$; no adjustments were made for multiple comparisons.

Results

Of 1,478 pregnancies complicated by chronic hypertension identified over the study period, 504 were excluded (Figure 1). Of the remaining 974 women, 683 (70.1%) with chronic hypertension reached 36 weeks.

Of these 683 women, 20 (2.9%) underwent a planned delivery between 36^{0/7}-36^{6/7} weeks (Table 1). Compared to the women expectantly managed beyond 36 weeks, women undergoing planned delivery at 36 weeks were more likely to have baseline renal disease. Women undergoing planned delivery at 36 weeks were also more likely to have pregestational diabetes. Medication use and average systolic and diastolic blood pressures in the first and second trimesters did not differ significantly between the two groups (Table 2). The average systolic and diastolic blood pressures from 28–32 weeks and 32–36 weeks were significantly higher in the planned delivery at 36 weeks group, although both averages were <140/90 mm Hg. The primary neonatal composite outcome occurred in 2 (10.0%) of women undergoing planned delivery between 36^{0/7}-36^{6/7} weeks compared to 17 (2.6%) of those receiving expectant management (Table 3, p=0.04, relative risk 3.9, 95% CI 1.0–15.8). In the planned delivery group, the two adverse neonatal composite outcomes consisted of a neonatal death secondary to cardiorespiratory failure and one infant placed on the ventilator for 7 days. In the expectant management group the 17 neonatal composite outcomes consisted of four stillbirths, six cord gases with a pH < 7.0, six infants placed on the ventilator, and one infant requiring continuous positive airway pressure. The minimum amount of time spent on the ventilator was 1 day.

Of the 572 women reaching 37^{0/7} weeks, 39 (6.8%) underwent planned delivery between 37^{0/7}-37^{6/7} weeks. Women undergoing planned delivery were more likely to have diabetes and baseline renal disease. Use of antihypertensive medication and average blood pressures throughout pregnancy were not different between groups. The primary neonatal composite outcome occurred more frequently in the planned delivery at 37^{0/7}-37^{6/7} weeks, although this was not statistically significant (5.1% versus 1.9%, p=0.17). No perinatal deaths occurred in the planned delivery group while 2 (0.4%) occurred in the expectant management group, both of which were stillbirths. In the planned delivery at 37 weeks group, the two adverse neonatal outcomes were ventilator use and an arterial pH < 7.0. In the expectant management group, the adverse composite neonatal outcomes consisted of two stillbirths, four arterial pH < 7.0, 3 infants requiring ventilation for >1 day, and one infant requiring continuous positive airway pressure ventilation.

Of the 414 women reaching 38^{0/7} weeks, 30 (7.2%) underwent planned delivery between 38^{0/7}-38^{6/7} weeks. Women undergoing planned delivery were more likely to have diabetes. Women undergoing planned delivery were also more likely to have baseline renal disease although this difference did not reach statistical significance. The primary neonatal outcome did not occur in any women undergoing planned delivery between 38^{0/7}-38^{6/7} weeks and in 9 (2.3%) of women expectantly managed after 38 weeks. No perinatal deaths occurred in the planned delivery group while 2 (0.5%) occurred in the expectant management group; both perinatal deaths were stillbirths. The other primary neonatal outcome events in the expectant management group were four infants with an arterial pH < 7, two infants requiring ventilation, one infant requiring continuous positive airway pressure ventilation.

Of the 280 women reaching 39^{0/7} weeks, 124 (44.3%) underwent planned delivery between 39^{0/7}-39^{6/7} weeks. Women undergoing planned delivery were similar to those receiving expectant management with respect to diabetes and baseline renal disease; women undergoing planned delivery were more likely to have had preeclampsia in a prior

pregnancy. The use of antihypertensive medication and average blood pressures prior to delivery were not significantly different. The primary composite neonatal outcome occurred in only 1 (0.8%) woman undergoing planned delivery between 39^{0/7}-39^{6/7} weeks compared to 5 (3.2%) in women receiving expectant management (p=0.17). No perinatal deaths occurred in the planned delivery group; two stillbirths occurred in the expectant management group. The adverse neonatal event in the planned delivery group was an arterial cord pH of 6.96. Of the remaining three adverse neonatal events in the expectant management group, two were arterial pH ≤ 7 and one was ventilator use for one day.

Preeclampsia, with or without severe features, was more likely to occur in the expectant management group, although these differences were not statistically significant until 38 weeks. Planned delivery was associated with an increased risk of primary cesarean delivery after a trial of labor only after 39 weeks (38.6% versus 20% at 39 weeks, relative risk 1.9, 95% CI 1.2–3.0). The incidence of an infant length of stay longer than 5 days was higher with planned delivery at every gestational age except for at 38^{0/7}-38^{6/7} weeks, although this was not statistically significant at any gestational age.

As a secondary analysis, we compared outcomes with a planned delivery between 36^{0/7}-38^{6/7} weeks with planned delivery at 39^{0/7} weeks and beyond (Table 4, Table 5). The planned delivery beyond 39^{0/7} weeks include those with an indicated or spontaneous delivery between 36^{0/7}-38^{6/7} weeks, as these are consequences of planned delivery beyond 39 weeks. Women with a planned delivery 36^{0/7}-38^{6/7} weeks were more likely to have pregestational diabetes or baseline renal disease and use antihypertensives prior to pregnancy than those undergoing a planned delivery at 39^{0/7} weeks and beyond (Table 4). The primary composite neonatal outcome was not significantly different between groups, nor was the incidence of perinatal death, primary cesarean in labor, or infant length of stay (Table 5). The incidence of severe preeclampsia and any preeclampsia was higher in the planned delivery beyond 39 weeks. Details of the four stillbirths and one neonatal death occurring after 36 weeks gestation are presented in Table 6.

Discussion

In this cohort, expectant management of pregnancies complicated by chronic hypertension beyond 39^{0/7} weeks was associated with increasing preeclampsia with severe features. Planned delivery at 36 weeks was associated with a significantly increased risk of the primary neonatal composite outcome, and delivery at 37 weeks with a non-significant increase in the risk of the primary neonatal composite outcome. These findings suggest that planned deliveries for uncomplicated chronic hypertension should occur after 38 weeks, although the optimal gestational age of delivery remains uncertain.

Our data are consistent with those of Hutcheon et al, who investigated the optimal gestational age of delivery in pregnancies with pre-existing hypertension in a large period-linked birth-infant death and stillbirth database.⁽¹⁰⁾ In this study the risk of serious neonatal morbidity was significantly reduced by delaying delivery until after 38 weeks without significant increases in stillbirth risk if delivery was accomplished by 40 weeks. Unfortunately, as their database did not distinguish between pre-existing hypertension and

super-imposed preeclampsia, they were unable to distinguish between indicated and non-medically indicated late preterm or early term deliveries. Consequently, the risk of ongoing pregnancy in the absence of super-imposed preeclampsia may be overstated.

Searching ClinicalTrials.gov and PubMed using the search terms “chronic hypertension,” “pregnancy,” and “induction of labor,” we identified a single randomized control trial investigating the gestational age of delivery in women with chronic hypertension (11) where 74 women were randomized to elective delivery at 37 weeks versus expectant management until 41 weeks. No difference was found in the risk of severe preeclampsia between groups; however, as the average gestational age at delivery in the planned delivery was 35 weeks, the lack of difference may be due to management choices and the risk of preeclampsia between recruitment and delivery, rather than lack of benefit to delivery at 37 weeks.

The main limitation of this study is the sample size—a limited number of patients were electively delivered prior to 39 weeks. As a result, we had limited power to detect a difference between groups. To detect the difference of 1.9% in the primary neonatal composite with expectant management compared to 5.1% with delivery, 578 patients would have been required for 80% power. The limited numbers of patients in the planned delivery group at 37 and 38 weeks therefore prevent us from making definitive recommendations. Additionally, intent was assessed retrospectively. For example, a patient presenting with spontaneous labor, stillbirth or with a new diagnosis of preeclampsia at 37^{4/7} week may have had a planned delivery within 37^{0/7}-37^{6/7} weeks that was not captured in data collection. This could have resulted in a misclassification bias. However, this is unlikely to have had a major influence on the results as we reviewed both the last chart note and the admission note to assess the intended gestational age of delivery. We also confirmed with chart review of the four late-preterm and term stillbirths that none were scheduled for elective delivery prior to diagnosis of the stillbirth, thus eliminating any misclassification bias for this crucial outcome.

Nonetheless, we feel that our results add to the literature due to the detailed, patient-level information that is available to us. In particular, we abstracted the indications for delivery, making it possible to determine whether the patient was electively delivered or if the delivery was indicated due to obstetrical or medical complications. We also considered the impact of the entire expectant management period on outcomes by comparing planned delivery at a given gestational age range (37^{0/7} – 37^{6/7} weeks) to expectant management at 37^{0/7} weeks, which is the most accurate reflection of clinical management and more inclusive of the risks that a patient occurs. For example, if a clinician sees a patient at 37^{0/7} weeks and elects to expectantly manage her until her next clinic visit at 38 weeks, she is incurring risk not just at 38 weeks, but also from 37^{0/7} to 37^{6/7}. Although studies using large data sets have compared delivery at a given gestational age range to expectant management beyond that range (i.e. delivery at 37^{0/7}-37^{6/7} weeks compared to delivery at 38^{0/7} weeks), we were able to distinguish between presentation for a scheduled delivery versus and an unscheduled delivery. Additionally, we had detailed information regarding maternal co-morbidities and blood pressure throughout pregnancy. Finally, we used strict ACOG definitions of preeclampsia and severe preeclampsia with either documented

proteinuria or laboratory abnormalities required for the diagnosis in addition to blood pressures.

In conclusion, expectant management beyond 39^{0/7} weeks was associated with increasing incidence of severe preeclampsia and planned delivery prior to 37 weeks was associated with increased adverse neonatal outcomes. This suggests that the optimal gestational age of delivery for chronic hypertension may be at 38–39 weeks. Further well-powered studies are needed to confirm the optimal gestational age of delivery in this growing population of women with pregnancies complicated by chronic hypertension.

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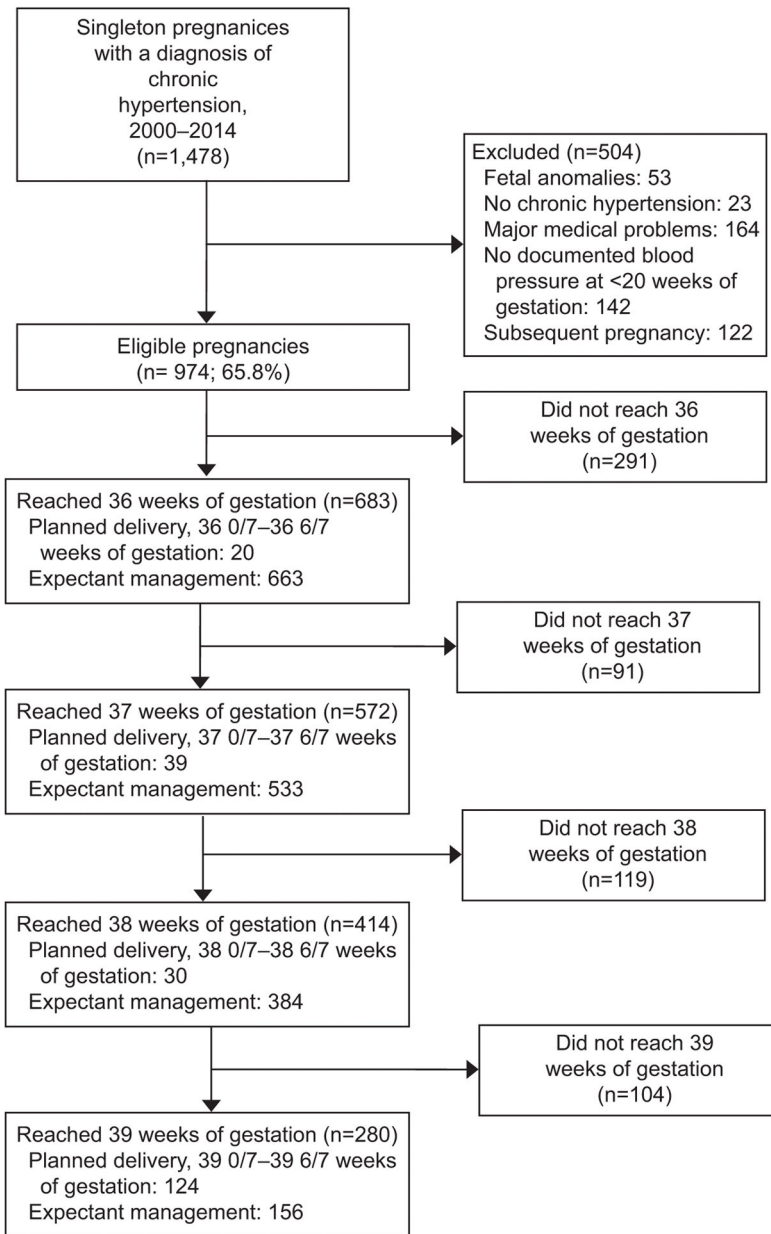


Figure 1.
Derivation of cohort

Baseline characteristics of cohort

Table 1

Characteristic	36 wks		37 wks		38 wks	39 wks	
	Delivery at 36-36.6	Expectant Mgmt >=36.0	Delivery at 37-37.6	Expectant Mgmt >=37.0	Expectant Mgmt >=38.0	Delivery at 39-39.6	Expectant Mgmt >=39.0
n	20	663	39	533	384	124	156
Age (years)	29.4 ± 5.8	30.3 ± 6.0	30.1 ± 5.6	30.4 ± 6.0	30.1 ± 6.2	30.0 ± 6.3	29.6 ± 6.2
Race							
White	7 (35.0%)	147 (22.2%)	10 (25.6%)	119 (22.3%)	84 (21.9%)	28 (22.6%)	38 (24.4%)
Black	13 (65%)	486 (73.3%)	28 (71.8%)	391 (73.4%)	278 (72.4%)	92 (74.2%)	108 (69.2%)
Hispanic	0	17 (2.6%)	1 (2.6%)	13 (2.4%)	13 (3.4%)	3 (2.4%)	3 (1.9%)
Other	0	13 (1.9%)	0	10 (1.9%)	9 (2.3%)	1 (0.8%)	7 (4.5%)
Nulliparous	7 (35.0%)	185 (27.9%)	12 (30.8%)	147 (27.6%)	117 (30.5%)	43 (34.7%)	44 (28.2%)
Government Insurance	13 (65.0%)	477 (72.0%)	22 (56.4%)	389 (73.0%)	288 (75.0%)	94 (75.8%)	126 (80.8%)
Midtrimester Body Mass Index (kg/m ²)	39.2 ± 6.8	39.6 ± 11.1	40.0 ± 13.1	39.9 ± 10.9	39.8 ± 10.5 [†]	41.6 ± 11.2	39.4 ± 9.9
Tobacco use	15.0%	19.9%	69 (15.6%)	103 (19.3%)	73 (19.0%)	18 (14.5%)	34 (21.8%)
Pregestational Diabetes	9 (45.0%)*	136 (20.5%)*	19 (48.7%)*	92 (17.3%)*	54 (14.1%)[†]	24 (19.4%)*	8 (5.1%)*
Gestational Diabetes	1 (5.0%)	83 (12.5%)	5 (12.8%)	67 (12.5%)	48 (12.5%)	13 (10.5%)	26 (16.7%)
Baseline Renal Disease	4 (20.0%)*	42 (6.3%)*	5 (12.8%)[†]	26 (4.9%)[†]	14 (3.7%)	2 (1.6%)	4 (2.6%)
Preeclampsia in a Prior Pregnancy	5 (25.0%)	206 (31.1%)	12 (30.8%)	163 (30.6%)	108 (28.1%)	23 (18.6%)*	54 (34.6%)*
Aspirin Use	4 (20.0%) [†]	47 (7.1%) [†]	3 (7.7%)	38 (7.1%)	25 (6.5%)	6 (4.8%)	7 (4.5%)
Antihypertensives Used Prior to Pregnancy	11 (57.9%)	364 (54.9%)	26 (66.7%)	280 (52.5%)	197 (51.3%)*	74 (59.7%)	67 (43.0%)
Medications Used During Pregnancy	17 (85.0%)	497 (75.0%)	29 (74.4%)	401 (75.3%)	291 (75.8%)	97 (78.2%)	111 (71.2%)

Data presented as mean ± standard deviation or as %

Comparisons being made between gestational age groups (i.e. Planned delivery at 36-36^{6/7} weeks compared to expectant management 36.0 weeks)

* p<0.01

[†] p<0.05

Table 2

Pregnancy Characteristics of Cohort

Characteristic	36 wks		37 wks		38 wks		39 wks	
	Delivery at 36-36.6	Expectant Mgmt >=36.0	Delivery at 37-37.6	Expectant Mgmt >=37.0	Delivery at 38-38.6	Expectant Mgmt >=38.0	Delivery at 39-39.6	Expectant Mgmt >=39.0
n	20	663	39	533	30	384	124	156
Gestational Age at Delivery (weeks) *	36.5 ± 0.3	38.4 ± 1.2	37.4 ± 0.3	38.8 ± 0.9	38.4 ± 0.3	39.2 ± 0.7	39.2 ± 0.2	39.7 ± 0.6
Blood Pressures (mm Hg)								
Average BP <20 Weeks EGA	130/75 ± 10/8	126/76 ± 11/8	125/74 ± 11/8	126/76 ± 11/8	125/75 ± 8/8	126/76 ± 10/8	125/75 ± 10/8	127/76 ± 11/8
Average BP 24-28 Weeks EGA	127/74 ± 11/7	123/72 ± 11/9	122/71 ± 13/7	123/72 ± 11/9	124/74 ± 11/10	122/71 ± 11/9	122/71 ± 10/8	122/72 ± 12/9
Average BP 28-32 Weeks EGA	130/75 ± 10/9 *	123/72 ± 11/8 *	122/71 ± 13/8	123/72 ± 11/8	124/72 ± 10/9	122/72 ± 11/8	122/72 ± 11/8	123/72 ± 12/9
Average BP 32-36 Weeks EGA	131/79 ± 15/12 *	125/75 ± 11/8 *	126/76 ± 17/10	125/74 ± 11/8	126/77 ± 15/7	124/73 ± 10/8	121/72 ± 9/7	124/73 ± 11/7

Data presented as mean ± standard deviation

BP: Blood Pressure, EGA: Estimated Gestational age.

Blood pressures were compared as systolic versus systolic, diastolic versus diastolic.

* p<0.01

Table 3

Outcomes of Planned Delivery versus Expectant Management at 36, 37, 38, and 39 weeks Gestation

Outcome	36 wks		37 wks		38 wks		39 wks	
	Delivery at 36-36.6	Expectant Mgmt >=36.0	Delivery at 37-37.6	Expectant Mgmt >=37.0	Delivery at 38-38.6	Expectant Mgmt >=38.0	Delivery at 39-39.6	Expectant Mgmt >=39.0
n	20	663	39	533	30	384	124	156
Primary Neonatal Composite Outcome	2 (10.0%)	17 (2.6%) [‡]	2 (5.1%)	10 (1.9%)	0	9 (2.3%)	1 (0.8%)	5 (3.2%)
Stillbirth	0	4 (0.6%)	0	2 (0.4%)	0	2 (0.5%)	0	2 (1.3%)
Neonatal Death	1 (0.2%)	0	0	0	0	0	0	0
Severe Preeclampsia/Eclampsia	1 (5.0%)	61 (9.2%)	0	42 (7.9%)	0	29 (7.6%)	0	16 (10.3%) [*]
Preeclampsia (any)	2 (10.0%)	113 (17.0%)	2 (5.1%)	79 (14.8%)	0	51 (13.3%) [‡]	3 (2.4%) [*]	24 (15.4%) [*]
Primary Cesarean in Labor	2/7 (28.6%)	126/487 (25.9%)	7/20 (35.0%)	107/401 (26.7%)	8/22 (36.4%)	77/297 (25.9%)	34/88 (38.6%) [*]	25/125 (20.0%) [*]
Infant Length of Stay > 5 days [§]	2/19 (10.5%)	52/659 (7.9%)	4/39 (10.3%)	35/531 (6.6%)	2/30 (6.7%)	25/382 (6.5%)	9/124 (7.3%)	4/154 (2.6%)

* p<0.01

† p=0.03

‡ p=0.05

§ Infant length of stay not calculated for stillbirths or neonatal deaths

Mgmt=Management

Bold face print indicates a p-value <0.05

Table 4

Baseline Demographics and Pregnancy Characteristics, Deliveries Planned 36–38^{6/7} Weeks Compared to Planned 39 Weeks

Characteristic	Planned Delivery 36–38 ^{6/7} Weeks	Planned Delivery 39 Weeks	p
n	89	594	
Age (years)	30.2 ± 5.5	30.3 ± 6.0	0.88
<u>Race</u>			0.52
White	25 (28.1%)	129 (21.7%)	
Black	63 (70.8%)	436 (73.4%)	
Hispanic	1 (1.1%)	16 (2.7%)	
Other	0 (0%)	13 (2.2%)	
Nulliparous	26 (29.2%)	166 (28.0%)	0.80
Government Insurance	59 (66.3%)	431 (72.6%)	0.04
Midtrimester Body Mass Index (kg/m ²)	41.5 ± 11.5	39.3 ± 10.9	0.12
Tobacco use	14 (15.7%)	121 (20.4%)	0.59
Pregestational Diabetes	36 (40.5%)	109 (18.4%)	<0.01
Gestational Diabetes	11 (12.4%)	73 (12.3%)	0.28
Baseline Renal Disease	13 (14.6%)	33 (5.6%)	<0.01
Preeclampsia in a Prior Pregnancy	27 (30.3%)	184 (31.0%)	0.44
Aspirin Use	9 (10.1%)	42 (7.1%)	0.05
Antihypertensives Used	55 (62.5%)	320 (53.9%)	<0.01
Prior to Pregnancy			
Medications Used During Pregnancy	67 (75.3%)	447 (75.3%)	0.99
<u>Blood Pressures</u> (mm Hg)			
Average BP <20 Weeks EGA	126/74 ± 10/8	126/76 ± 11/8	0.79, 0.24*
Average BP 24–28Weeks EGA	123/72 ± 12/8	123/72 ± 11/9	0.76, 0.53*
Average BP 28–32Weeks EGA	124/72 ± 12/8	123/72 ± 11/8	0.38, 0.94*
Average BP 32–36 Weeks EGA	127/77 ± 16/10	125/74 ± 11/9	0.14, 0.01*

* P-value for blood pressures: The first p-value represents the comparison of average systolic, the second p-value represents the comparison of the average diastolic. BP=blood pressure

Table 5Outcomes of Deliveries Planned 36–38^{6/7} Weeks Compared to Planned 39 Weeks

Outcome	Planned Delivery 36–38 ^{6/7} Weeks	Planned Delivery 39 Weeks	p	AOR (95% CI)
n	89	594		
Primary Neonatal Composite Outcome	4 (4.5%)	15 (2.5%)	0.29	1.9 [*] (0.6–5.9)
Perinatal Death	1 (1.1%)	4 (0.7%)	0.50	-
Severe Preeclampsia/Eclampsia	1 (1.1%)	61 (10.3%)	<0.01	0.07 [†] (0.01–0.5)
Preeclampsia (any)	4 (4.5%)	111 (18.7%)	<0.01	0.1 [‡] (0.04–0.35)
Primary Cesarean in Labor	17 (34.7%)	111 (24.9%)	0.14	1.6 [§] (0.8–3.0)
Infant Length of Stay >5 days	8 (9.1%)	46 (7.8%)	0.67	1.0 [¶] (0.5–2.3)
Gestational Age at Delivery (weeks)	37.6 ± 0.8	38.4 ± 1.2	<0.01	-

* Adjusted for nulliparity, tobacco use

† Adjusted for baseline renal disease

‡ Adjusted for baseline renal disease, aspirin use

§ Adjusted for nulliparity, body mass index

¶ Adjusted for nulliparity, diabetes

-Not performed due to either small numbers or continuous variable

Table 6

Characteristics of Stillbirths after 36 weeks

Characteristic	Stillbirth #1	Stillbirth#2	Stillbirth#3	Stillbirth#4	Neonatal Death
Gestational Age at Delivery	36.7	36.8	39.2	40	36.8
Maternal Age	23	17	24	30	29
Race	Black	Black	White	White	Black
Nulliparous	No	Yes	Yes	Yes	Yes
Prior Cesarean	No	No	No	No	No
Tobacco Use in Pregnancy	Yes	No	Yes	No	No
Diabetes	No	Pregestational	No	Pregestational	No
Renal Disease	No	No	No	No	No
Years with Chronic Hypertension	1	1	<1	3	3
Medications Prior to Pregnancy	No	Yes	No	No	Yes
Medications During Pregnancy	Yes Methyl/Dopa	Yes Methyl/Dopa	No	Yes Methyl/Dopa	No
Gender	Male	Male	Male	Male	Female
Birth Weight	3230	1485	3750	3725	2790
Average Blood Pressures					
<20 weeks	136/90	125/77	135/72	119/77	114/69
24–28 weeks	132/83	130/92	136/63	131/81	120/73
28–32 weeks	126/75	129/70	140/67	125/91	116/69
32–36 weeks	129/73	126/76	124/74	124/85	120/71
Last Prenatal Care Visit					
Gestational Age	35.7 wks	36.6	38.8	38.9	36.8
Blood Pressure	140/90	132/84	152/88	120/80	120/70
Urinalysis for Protein	Not Documented	Not Documented	+4	Not Documented	None Detected
Antenatal Testing	Yes, CST	No	Yes, CST	Yes, CST	Yes, CST

CST=Contraction Stress Test