

# Clinical Variance of the Nulliparous, Term, Singleton, and Vertex-Presenting Metric

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**OBJECTIVE:** To compare the likelihood of a cesarean delivery of pregnancies identified as nulliparous, term, singleton, and vertex-presenting (NTSV) and which can be deemed as low risk, with those NTSV pregnancies which can be considered as high risk according to some standards.

**STUDY DESIGN:** Data from a single institution were used to retrospectively examine the appropriate

perinatal qualifiers in order to compare the ultimate delivery type that the pregnant patient underwent, and to compare results between the low-risk and high-risk patient groups.

**RESULTS:** Within a 7-year span of time, of the 6,146 patients who were identified as having NTSV pregnancies, there were 4,184 patients who were considered at low risk and 1,962 that were deemed at high risk of cesarean delivery, by virtue of the recognized diagnoses that were made (pregestational diabetes, gestational diabetes, chronic hypertension, pregnancy-induced hypertension, intrauterine growth restriction, oligohydramnios or polyhydramnios, maternal age >40, or placenta previa).

**CONCLUSION:** A statistically significant difference

was found between the low-risk and high-risk NTSV patients in terms of the cesarean delivery rate for those patients. This calls into question whether the NTSV metric should represent low-risk deliveries. (J Reprod Med 2018;63:491–494)

**Though the NTSV cesarean rate intends to relate to low-risk pregnancies, it may not actually be used in this way.**

**Keywords:** breech presentation, cesarean section, fetal presentation, gestational diabetes, labor presentation, obstetric deliv-

ery, pregnancy outcome, repeat cesarean section, singleton pregnancy, term pregnancy, vertex.

Use of the nulliparous, term, singleton, vertex-presenting (NTSV) cesarean delivery rate (CDR) has been encouraged as a measure to compare the cesarean rates across providers and institutions, perhaps to help lower the currently rising CDR.<sup>1,2</sup> Though this metric is used to refer to pregnancies at low risk for cesarean delivery,<sup>3</sup> the actual cesarean risk may need to be reconsidered for the NTSV pregnancy. There can be a clinically meaningful wide variance that may diminish its utility for this, as “high-risk” patients are necessarily included in this measure. While considering NTSV pregnancies

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as having the accepted indications for cesarean delivery (e.g., breech presentation, twin delivery, and previous cesarean), there are other factors to be considered for a presenting patient to be truly considered to be at “low risk” for cesarean. The authors have investigated the use of this metric in their own patient pregnancy population in order to determine if a universally recommended NTSV CDR is appropriate as a measure of physician performance, considering that both low-risk and high-risk pregnancies are included in this metric.

There are specific diagnoses that have been described as being associated with cesarean delivery. For example, pregestational diabetes mellitus is associated with both elective and emergency cesarean deliveries.<sup>4</sup> Gestational diabetes mellitus has also been shown to increase the CDR.<sup>5</sup> Chronic hypertension causes an increased CDR, as well as pregnancy-induced hypertension.<sup>6–8</sup> Intrauterine growth restriction is another prenatal diagnosis which has been shown to increase the CDR.<sup>9</sup> The relative amount of amniotic fluid appears to affect the risk of cesarean delivery, whether it is restricted (oligohydramnios) or excessive (polyhydramnios).<sup>10,11</sup> Advanced maternal age is another qualifier associated with an elevated CDR.<sup>12</sup> Placenta previa is naturally associated with cesarean, certainly if the sonographic diagnosis demonstrates that it is a central placenta previa. The diagnostic criteria for NTSV does not use any of these diagnostic qualifiers, yet it is described as indicating pregnancies at “low risk” of cesarean.<sup>3</sup>

### Materials and Methods

The antepartum record of all prenatal patients scheduled to deliver at Advocate Illinois Masonic Medical Center are submitted to Labor & Delivery (L&D), including any designated diagnoses and conditions which were found. Upon confirmation of this information at the time of admission to the hospital, these data are entered into our Structured Query Language (SQL) perinatal database, which is also used to collect the salient clinical data elements to be used for reporting to various outside agencies, and for research. For the time period of this investigation, we compared those nulliparous, term (37–41 weeks of gestation), singleton, vertex-presenting patients presenting to L&D, in terms of the presence of predetermined diagnoses, which may be associated with some degree of maternal or perinatal morbidity.

The specific diagnoses selected as criteria which

may indicate the need for a possibly higher risk for an operative delivery included diabetes mellitus, gestational diabetes mellitus, chronic hypertension, pregnancy-induced hypertension, intrauterine growth restriction, oligohydramnios or polyhydramnios, maternal age >40, and placenta previa. If any of these diagnoses were present, they would be considered as NTSV<sub>HighRisk</sub> and if not, they would be considered as NTSV<sub>LowRisk</sub>. The NTSV cesarean rates were compared between these 2 groups of patients over the course of 7 years (2010–2016). These patient groups were statistically analyzed using a  $\chi^2$  test, and this investigation was approved by our Institutional Review Board.

### Results

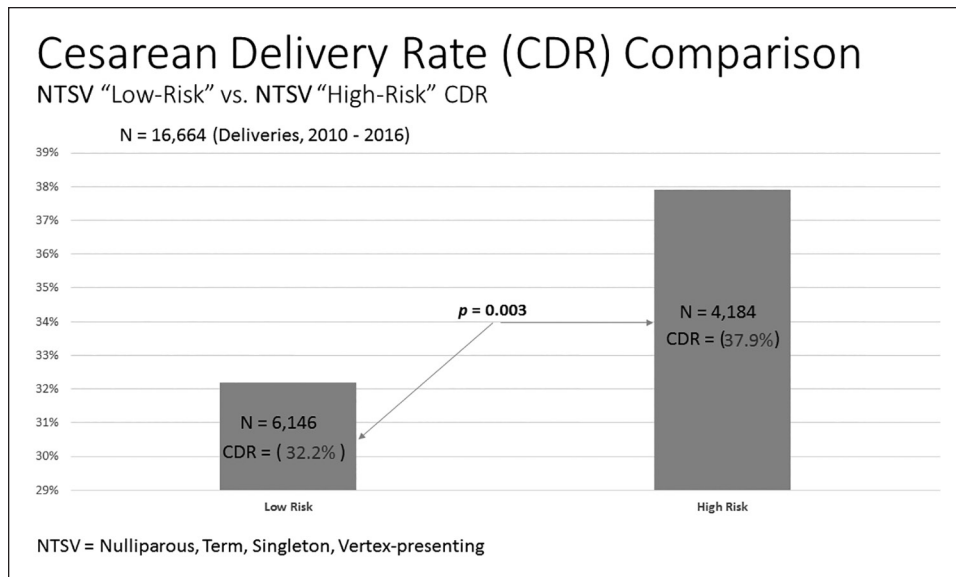
During the period of time of the investigation (2010–2016), there were a total of 16,665 deliveries at this institution. Of these, a total of 6,146 NTSV patients were identified, with 4,184 being designated as NTSV<sub>LowRisk</sub> (Group A) and 1,962 as NTSV<sub>HighRisk</sub> (Group B), according to the recorded prenatal histories. Table I displays the incidence of the high-risk conditions included in Group B in the described population relative to the incidence in the United States, as per the National Center for Health Statistics.

The NTSV CDR for the entire selected population was 34.0%. The calculated CDR for Group A was 32.2%, and that for Group B was 37.9%, showing a statistically significant difference between these groups with regard to the CDR ( $p=0.003$ ). Figure 1 demonstrates this comparison. It should be noted that the induction of labor rate of Group

**Table I** Incidence of Conditions (2010–2016)

Condition	Incidence here* (%)	Incidence in USA (%)	p Value
Diabetes mellitus	0.5	0.48 <sup>13</sup>	NS
Gestational diabetes	4.8	4.0 <sup>13</sup>	0.004
Chronic hypertension	2.2	1.3 <sup>6</sup>	<0.001
Pregnancy-induced hypertension	13.8	4.0 <sup>13</sup>	<0.001
Intrauterine growth restriction	1.4	3.0 <sup>15</sup>	<0.001
Oligohydramnios/polyhydramnios	7.1	7.6 <sup>10,11</sup>	<0.001
Placenta previa	0.5	0.5 <sup>13</sup>	NS
Age >40	2.4	0.87 <sup>13</sup>	<0.001

\*Advocate Illinois Masonic Medical Center.  
NS = not significant.



**Figure 1**  
Cesarean delivery rate comparison, low risk versus high risk.

A was 46%, and that of Group B was 73%, representing a 59% increase in the induction rate from low risk to high risk.

### Discussion

Though the NTSV cesarean rate intends to relate to low-risk pregnancies,<sup>3</sup> it may not actually be used in this way. Ours is a tertiary care institution, treating a population with a variety of comorbidities, somewhat dissimilar from the national incidences that have been noted in Table I.<sup>13-15</sup> In order to maintain accuracy and consistency of any metric which is used for such monitoring, the definitions that are used need to be definitive and qualified to measure the specific issue that is most discriminant and clinically important.<sup>16</sup>

It appears that the risk of ultimately being delivered by cesarean section for a pregnant woman having pregestational diabetes mellitus, hypertension, pregnancy-induced hypertension, intrauterine growth restriction, oligohydramnios or polyhydramnios, placenta previa, or for a maternal age >40 when presenting to L&D is different for a woman without such disease/condition at presentation. While these conditions may indicate the medical need for early intervention and/or induction of labor, it is important to distinguish the possibly increased risk of operative delivery that can result from induction of labor,<sup>17-19</sup> if this is simply the proper management of the respective condition. The consensus of obstetric providers

suggests that intervention for the listed morbidities results in better perinatal outcome than expectant management, as is also indicated in the medical literature.

Although the perinatal data reported here are not exactly comparable to that reported elsewhere, these findings indicate the flaw of NTSV used as a metric in tertiary care institutions engaged in childbirth. According to a recent report from the National Center for Health Statistics, the national NTSV CDR in 2013 was 26.9%, whereas ours was 34%. The discrepancy between our institution's report and the national figure appears likely to be the difference in our institution's incidence of the comorbidities reported in this investigation. This report presents evidence to suggest that the NTSV pregnancy may not just refer to the "low-risk" pregnancy.

Other investigators have identified demographic and nonclinical factors that may also have an impact on the NTSV CDR, questioning the validity of this as a universal quality measure for comparing providers and institutions.<sup>20-23</sup> The NTSV CDR may be a valid measure for comparison between practitioners and institutions, eliminating the commonly used indications of repeat cesareans, twin, and breech presentations. The Society for Maternal-Fetal Medicine defined those who are at low risk for cesarean delivery by providing specific International Classification of Diseases (ICD)-coded diagnoses<sup>24</sup> but which do not exactly

match the conditions which were specifically selected as criteria to distinguish high-risk and low-risk populations in this investigation. Of course, the NTSV metric does not take into consideration any of the diagnoses mentioned with either diagnosis set. Though the NTSV CDR may be meant to apply to low-risk pregnancies, there are no specific diagnostic criteria used in describing this rate, other than selecting for the parity, gestational length, plurality, and presentation (i.e., NTSV). Our data suggest a significant difference between the “low-risk” and “high-risk” parturient at presentation to L&D with regard to the risk of cesarean delivery. Such a conclusion was recently found elsewhere as well.<sup>25</sup>

The authors look forward to the commentary of others in the obstetric provider community on this matter.

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