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Introduction

- C-section rates have been rising over the last several decades without corresponding decrease in morbidity or mortality, exposing both the mom and baby to dangerous short- and long-term risks^{1,2,3,4}
- C-section rates vary drastically between states and clinical sites, indicating a broad range of exposure to c-section risk¹
- NTSV pregnancies (nulliparous, term, singleton, vertex) are a low-risk pregnancy model studied to simplify factors of pregnancy and highlight elements of provider decision making⁵.
- CDC and HealthyPeople2030 NTSV c-section rate goal: 23.6%^{6,7}
- ACOG emphasizes quality improvement (QI) projects as the most effective tool to standardize provider approach and reduce c-section rates, through clinical champions and culture of care^{8,9}
- Goal: to reduce NTSV C-section rates to goal of 23.6% by implementing an evidence-based labor dystocia checklist in four northern Colorado hospitals

Methodology

- Developed and implemented an evidence-based, digital labor dystocia checklist as a tool to guide decision making during labor and prior to proceeding to c-section
- Primary outcome: monthly NTSV c-section rate
- Secondary outcomes: primary indication for c-section, if diagnostic criteria were met for arrest of labor, and patient request for c-section in the absence of medical recommendation
- 4 UHealth hospitals in northern Colorado participated in data collection, with clinical champion recruited at each site
- This project was part of a larger group, the Colorado Perinatal Care Quality Collaborative (CPCQC), a statewide collaborative team
- HQIPP (hospital quality incentive payment program) is a Colorado-based program that provides financial incentives for hospitals for participating in QI projects, providing administrative support
- Pre-intervention phase: 4 month; Intervention phase 26 months
- Paired t-test to assess change in c-section rates from baseline

FIGURE 1: Labor Dystocia Checklist

Is the provider unable to augment labor with Oxytocin or AROM due to non-reassuring fetal heart rate?

Yes, non-reassuring fetal heart rate despite intrauterine resuscitative measures: **DON'T COMPLETE CHECKLIST**

No, fetal heart rate does not prohibit augmentation of labor: **CONTINUE WITH CHECKLIST**

Diagnosis of Failed Induction of Labor (all 3 should be present)

(X) 1. Patient is status-post rupture of membranes SROM (1) or AROM (2) No (3)

(Y) 2. Patient has been receiving Oxytocin for 12-18 hours after rupture of membranes yes (1) no (0)

(Z) 3. Patient has failed to reach 6 cm of dilation or greater yes (1) no (0)

pt request to stop induction

Diagnosis of Arrest of Dilation (all 3 should be present)

(AA) 1. Patient has reached 6 cm of dilation or greater (1) No (0)

(AB) 2. Patient is status-post rupture of membranes: SROM (1) AROM (2) No (3)

(AC) 3. Patient has had lack of cervical change for at least either: yes (1) No (0)

4 hours of adequate uterine activity (e.g. MVUs > 200) OR 6 hours of Oxytocin administration with inadequate uterine activity

pt request to stop labor/augmentation

(AD) Diagnosis of Arrest of Descent (only 1 needed)

Did the patient push for 3 hours with inadequate fetal descent? yes (1) No (2)

pt request to stop pushing

None of the above apply, delivery provider decision for cesarean due to lack of any progress in descent with adequate pushing (Clinical judgement)

FIGURE 1: Evidence-based Labor Dystocia Management Digital Checklist

Results

- 4,395 NTSV deliveries occurred across the four sites during the study, with 727 ending in c-section.
- Three of the four sites showed reduced average NTSV c-section rates compared to baseline, although statistical significance was not proven (p-value > 0.05).
- Site 3 showed the strongest predictable response to the checklist intervention, while site 2 showed the most resistance.
- Non-reassuring fetal heart rates were the most common reason for c-section, followed by Arrest of Descent (Stage 2 Labor).
- Only 56% of the Arrest of Descent cases met diagnostic criteria, lower frequency than the two earlier stages of labor (68% and 88%, respectively)
- Patients who requested c-section outside of medical recommendation were 1.8-3.2% of monthly c-sections and occurred mostly in Stage 1 latent or active.

Table 1: Average NTSV C-Section Rates by Site

	Site 1	Site 2	Site 3	Site 4
Pre-intervention	20.18	25.14	26.17	19.05
Post-intervention (2025 only)	18.3	23.68	15.49	20.49

TABLE 1: Average NTSV C-section rates by site before and after intervention

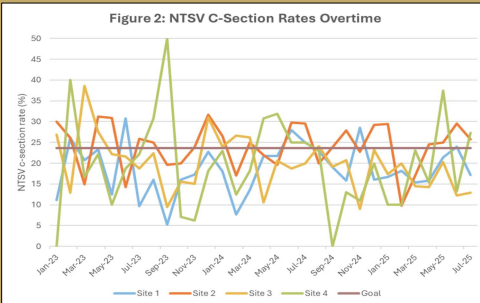


FIGURE 2: Monthly NTSV C-section rates by site overtime. Goal NTSV rate is 23.6%. Intervention began May 2023

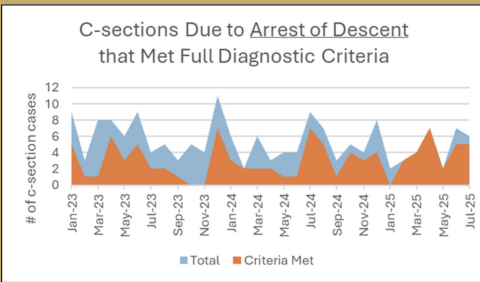


FIGURE 3: Number of c-sections documented as indicated for arrest of descent, and how many met full diagnostic criteria, across clinical sites 1-3.

Discussion

Primary Outcome

- For monthly NTSV c-section rates, although statistically significant changes were not determined, three of the four clinical sites ended the intervention phase with NTSV averages below the goal of lower than 23.6%.
- Absence of statistical significance is likely due to a relatively small amount of data comprising the baseline data, selection of statistical test, or duration of project lasting less than 3 years.
- Several theories exist for why site 2 was the least responsive site, including more time needed for the impact to be evident, site-specific differences, and provider groups servicing this location.

Secondary Outcomes

- Arrest of Dilation (stage 2 of labor) was the second most common reason for a provider proceeding to c-section and the most common stage for a patient to be in during arrest of labor.
- Of the three stages for potential arrest of labor, Stage 2 was the least likely to meet diagnostic criteria, with providers opting for their clinical judgement as reason for arrest of this stage, rather than waiting for the recommended time to meet diagnostic criteria.
- This difference is not due to patients requesting a c-section during this time; it is likely due to providers after seeing minimal improvement for 1-2 hours, feeling that little to no additional progress will come from prolonging pushing for the remaining recommended hour.
- Further investigation is needed into what factors during this stage of labor are influencing providers' decisions to opt for c-section sooner than the evidence-based recommended time.

Limitations:

- Without significant significance, this study is limited in its ability to link the changes in NTSV c-section rates with the intervention at hand. It is quite possible that alternative statistical approaches would have yielded significance and will be considered in the future
- Data was not gathered on how often teams were implementing this checklist. This could provide insight into the implementation of the project rather than the checklist itself influencing the site's data.

Conclusion

The labor dystocia checklist successfully reduced the NTSV c-section rate at multiple clinical sites to at or below 23.6%, with room for statistical strengthening in the future. Stage 2 of Labor emerged as a target for improving provider adherence to evidence-based recommendations to reduce c-section rates.

Acknowledgements

Special thanks to my mentor, Dr. J. Bradley Stern, MD, to Robyn Gustafson, MSN, APRN, CPNP-PC, C-ONQS, and the members of the SOAR (supporting vaginal delivery for low-risk mothers) team within CQCPC.

Disclosures

No contributing parties have any conflicts of interest to disclose.

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