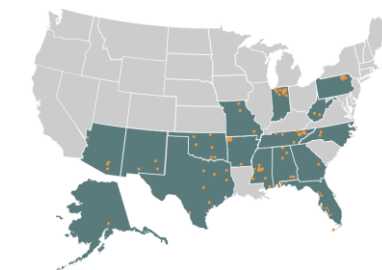


# Reducing Modifiable Factors that Contribute to Preventable Birth Injury

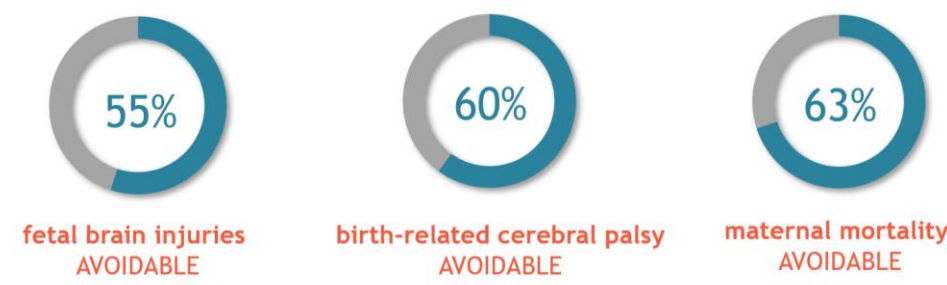
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## National Background

Birth related injuries with permanent sequelae carry devastating consequences for families, extreme costs for healthcare systems and personal despair for clinicians. **More than half of the most severe complications are potentially avoidable.**<sup>1-4</sup>



Loss of situational awareness is found in about half of labors with potentially preventable fetal brain injury.<sup>4</sup> Delayed recognition and clinical response to warning signs apparent on the fetal heart rate and contraction tracings are common in birth-related brain injury.

## Our Environment

Community Health Systems (CHS) is a leading operator of general acute care hospitals and outpatient care centers in communities across the United States. CHS affiliates own, lease or operate 83 affiliated hospitals in 16 states with an aggregate of approximately 13,000 licensed beds. 58 facilities offer obstetrical services with a total of approximately 54,000 births during calendar year 2021.

The CHS PSO, LLC is a component entity of CHS/Community Health Systems, Inc. The CHS PSO, LLC is an Agency for Healthcare Research and Quality (AHRQ) certified Patient Safety Organization (PSO): #P0122.

## Relevance of the Clinical Conditions

Fetal heart rate (FHR) tracings are classified into 3 categories per NICHD guidelines. If a tracing in Category 2, does not improve over a period of 1 to 2 hours, or the fetal tracing deteriorates further, a decision should be made for expedited delivery. Delay can lead to fetal acidosis or hypoxia.<sup>5,6</sup>

Errors that involve IV oxytocin administration for labor induction or augmentation are most commonly dose-related due to lack of timely recognition and delay in appropriate treatment of excessive contraction activity (uterine tachysystole).<sup>6</sup>

The CHS PSO sought to augment the organization's OB safety program with a maternal/ fetal early warning system technology component that would promote situational awareness and timely recognition and intervention for these conditions that can contribute to birth injury.

## Aims

- To reduce the incidence of uterine tachysystole lasting more than 2 hours.
- To reduce the incidence of fetal heart rate tracings that persist in Category 2 for longer than 90 minutes.

## Actions Taken

Implementation of a Maternal/Fetal Early Warning Software (Vigilance™ PeriGen, Inc Cary, NC) at the bedside, nurse's station, manager's offices, and OB call rooms to promote situational awareness.

The software:

- consolidates critical information in a single display using color to highlight deviations from standard accepted parameters
- displays information over many hours so that clinicians can quickly see the degree and duration of abnormalities and trends over time
- identifies the presence of uterine tachysystole and grades the EFM tracing in 3 categories
- tracks and analyzes maternal vital signs and labor progression
- provides timely and relevant support regarding fetal heart rate tracing assessment
- operates continuously at the point of care
- does not require any additional input from clinicians
- is compatible with multiple existing EHRs and fetal monitoring applications across the health system
- promotes standardization of acceptable safety norms across our hospital system
- provides on-line analytics



The software produces reports including the incidence and duration of key problematic and modifiable fetal heart rate and uterine contraction patterns so that individual facilities can evaluate their progress.

The software can summarize findings for specific subgroups of interest, such as term babies with an unexpected admission to the NICU.

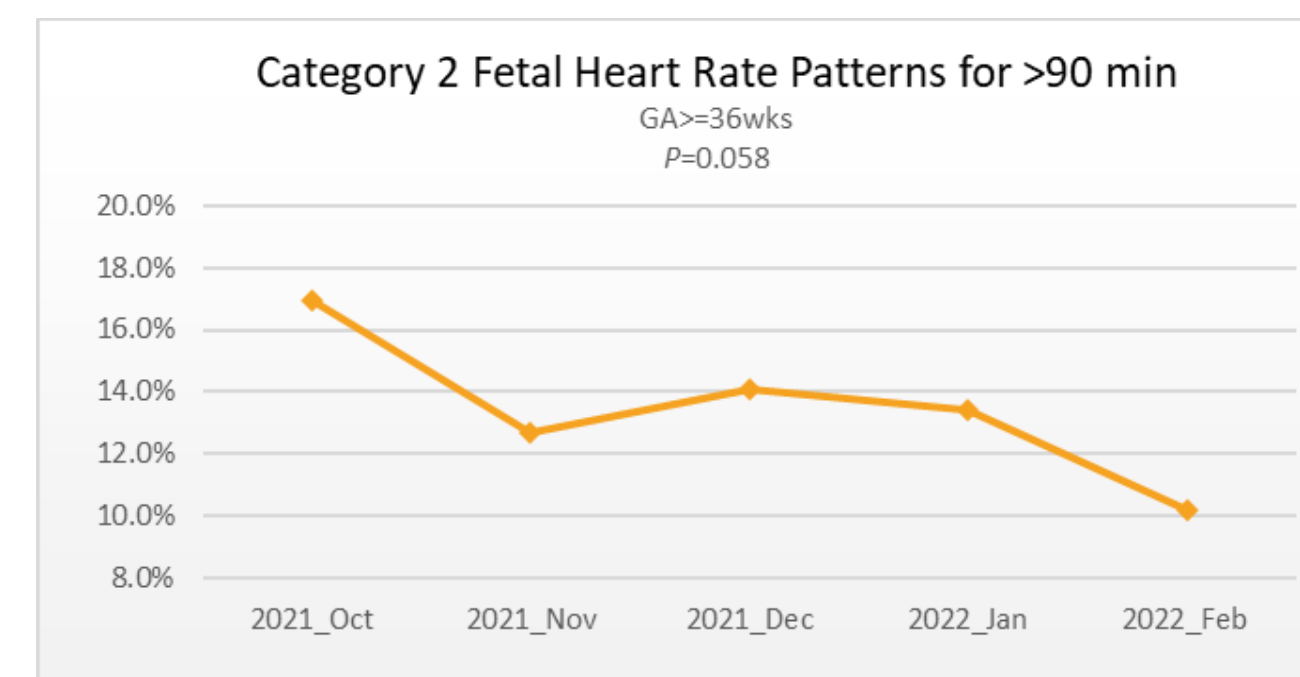
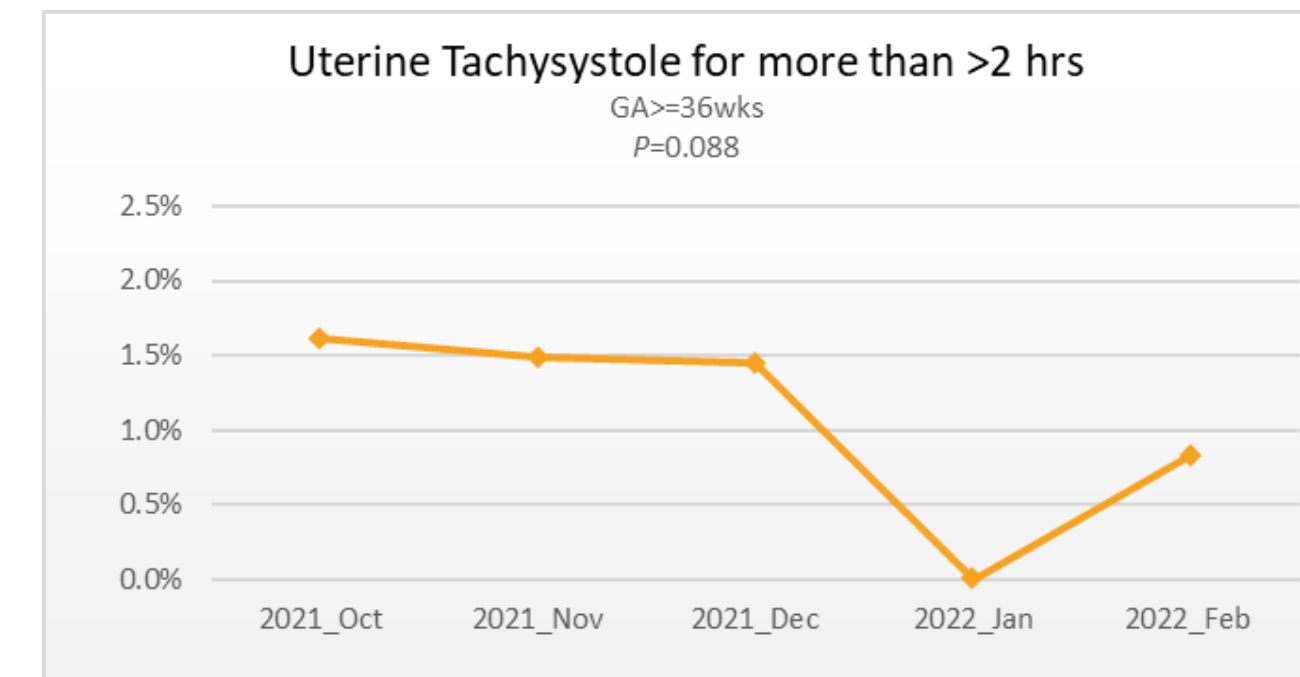
It identifies records that have exceeded established parameters that may include modifiable factors prompting a more detailed chart review at the facility level.

## Results

A total of 1888 tracings were obtained between October 1, 2021, and February 28, 2022, from women with a recorded gestational age of 36 weeks or greater. The following graphs show the evolution in the rates of the conditions in our two AIM statements after the introduction of the early warning software at the bedside. Rates of these conditions prior to the installation of the software are not available due to the inability to extract this data from the EHR.

We observed the following in women with a gestational age of 36 weeks or more:

- A **50.0% reduction** in the percentage of tracings with uterine tachysystole for more than 2 hours. (from 1.6% to 0.8%)
- A **39.6% drop** in the percentage of fetal heart rate tracings showing persistence in Category 2 for longer than 90 minutes. (from 16.9% to 10.2%)



## Conclusions

The trends do not quite reach statistical significance as the study numbers are relatively small as deployment is not yet complete across all sites. Nevertheless, these early findings are encouraging for the following reasons:

- The rates of prolonged uterine tachysystole are very low compared to reports in the literature where rates of uterine tachysystole often exceed 10%.<sup>8,9</sup>
- More than half of all tracings from women in labor will reach Category 2 at some point.<sup>10,11</sup> These results indicate that clinical practice is increasingly successful because fewer women are experiencing long periods of Category 2 tracings which impart greater fetal risk.

Lessons learned

- Early data suggests an opportunity for continued improvement
- Frequent feedback to local units and the ensuing discussions are invaluable  
They help teams understand and develop ways to mitigate local factors. For example, improving provider access to the bedside analytics facilitates communication and ensuing management decisions, especially when providers are offsite. It also provides an opportunity for positive feedback to help sustain engagement.
- Activating the chain of command remains an additional opportunity  
Formalization of the chain of command process with delineation of roles and responsibilities may additionally enhance communication and collaboration. Increased involvement of the charge nurse in such conversations may lessen the authority gradient and its associated issues and bring additional experience and perspective to mitigate potential problems.

We would like to thank and acknowledge the professionalism, dedication and talent of our staff who have enthusiastically implemented this patient safety improvement program despite the challenges of COVID-19.

- To our bedside clinicians: These results reflect your work and continuing efforts to deliver better care.
- To our Information Systems and Information Technology business partners: These results reflect your dedication to successfully navigating the challenges of an aggressive deployment schedule and the excitement you shared in contributing to the safety of mothers and babies.
- To our clinical leaders and committee members: These results reflect your wisdom and efforts to make our organization safer.
- To our senior administration: These results reflect your leadership and understanding that there are many issues underpinning improvement. Thank you for your vision and providing the resources to mitigate them.

Thank you to the PeriGen staff who contributed material for this poster.