Challenges Integrating Artificial Fetal Monitoring Intelligence to Improve Patient Safety

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Outline

- Overview
- Maternal and Neonatal Injury
- Tracing Management
- ACH Implementation
- Challenges
- Reimplementation
- Looking Forward

To improve maternal and neonatal outcomes, NewYork-Presbyterian invested in an AI overlay Technology, *Perigen Vigilance.*

Overview of the NYP-Perigen Team

8 campuses participated in the initiative

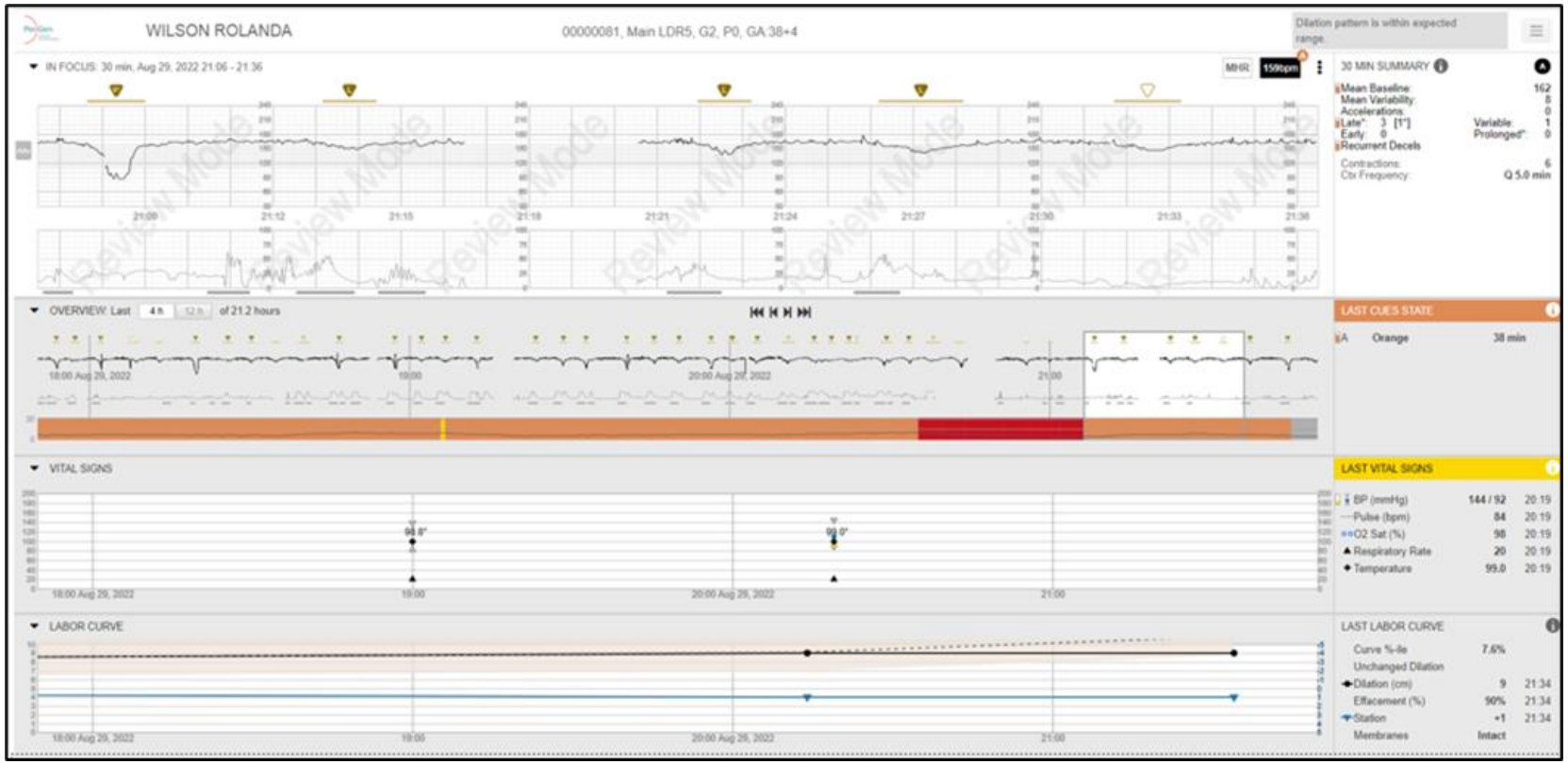
- Columbia
- Cornell (Alexandra Cohen Hospital for Women's and Newborns)
- Lower Manhattan
- Hudson Valley
- Queens
- Allen
- Westchester
- Brooklyn

- Enterprise Efforts
  - Quality and Patient Safety Team
  - Perigen Support Team
  - Campus Champions
    - Patient Care Directors
    - Physician Lead
    - Patient Safety Nurses
    - Medical Directors

Goal: to decrease preventable maternal and neonatal injury and mortality.

What is Perigen Vigilance ?

- Overlay Warning System
  - Artificial Intelligence
- Communicates with Epic EMR
- Interpretation of fetal heart rate (FHR) characteristics
  - Identifies:
    - Decelerations – type, duration, nadir, frequency
    - Baseline FHR
    - Variability
    - Contraction pattern
- Maternal Vital sign monitoring
- Turns fetal tracing characteristics and maternal vital signs into color cues alerting system
  - Green, Yellow, Orange, Red, Purple



Neonatal Injury

- Hypoxic-Ischemic Encephalopathy --> Neonatal Encephalopathy
  - Central nervous system dysfunction
  - Commonly related to a hypoxic-ischemic birth event
    - Signs of hypoxic or ischemic events can be first seen with electronic fetal monitoring
- Neonatal Encephalopathy (NE)
  - Occurs between 2-9 per 1,000 live births
  - Diagnosis in 50-80% of cases is bases on clinical presentation, MRI and EEG criteria
- Treatment
  - Therapeutic Hypothermia - "cooling"

Maternal Injury

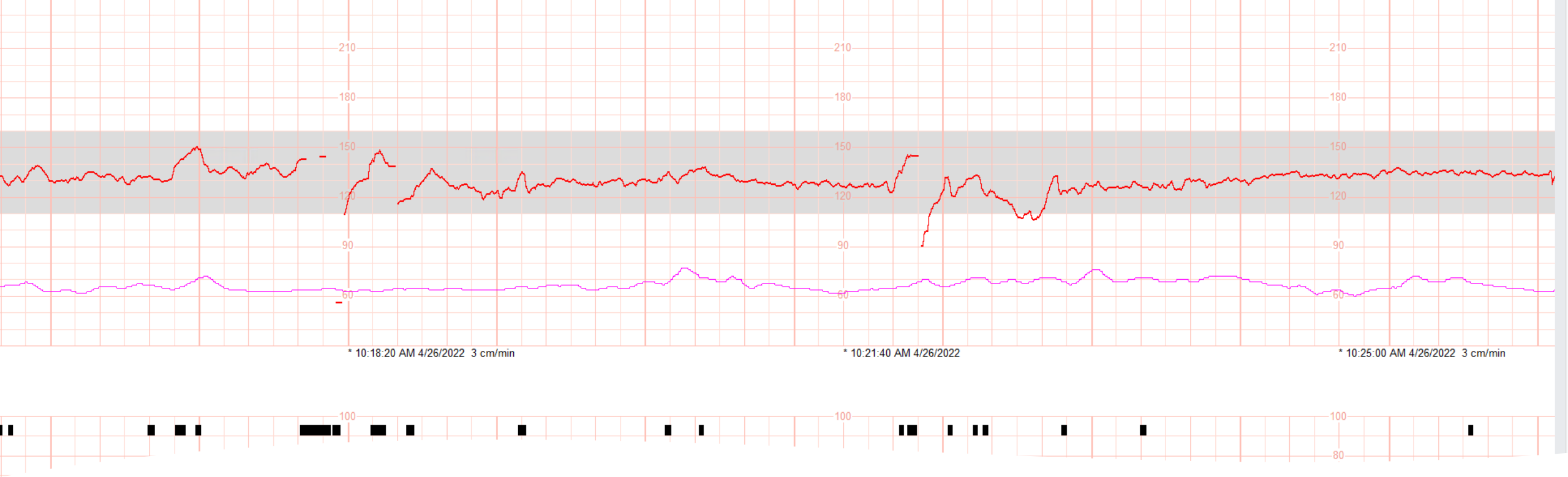
Early Warning Signs

- Hypertensive disorders of Pregnancy
  - Chronic HTN
  - Gestational HTN
  - Preeclapmsia
    - Severe
    - Superimposed
    - Eclampsia
- Maternal Infection
  - Chorioamnionitis
  - Sepsis

PARAMETERS:	CALL A HUDDLE WHEN:
Low Systolic BP	< 90 mmHg
High Systolic BP	> 160 mmHg
High Diastolic BP	> 100 mmHg
Low Heart Rate	< 50 bpm
High Heart Rate	> 120 bpm
Low Respiratory Rate	< 10 / min
High Respiratory Rate	> 25 / min
Low O2 Saturation	< 95%
Neurologic	Altered mental status: confused, agitated, unresponsive
Oliguria	< 0.5cc/Kg over two hours
Other	• Excessive Bleeding: > 50% of pad w/I 15 minutes; clots, increased fundal height; atony Any Critical or unanticipated lab values Pt in PACU/Vaginal recovery > 4 hours Return transfer from Postpartum Any staff member has concern about patient condition.

Electronic Fetal Monitoring

- Assessment of fetal status throughout the labor process
- Alerts us to oxygenation status of the fetus in utero through detecting changes in the heart rate pattern
  - This allows for interventions to treat underlying causes
  - Prompts to identify maternal diagnoses that may impact the fetal heart rate
- Helps with the prevention of Neonatal Brain Injury by allowing for early intervention for Cat II and Cat III tracings
- Our goal is always for a healthy mom and baby!



Tracing Interpretation & Management

- User variability in interpretation
  - Agreement on tracing category is statistically around 50%
- Nurses and Providers working on the Labor and Delivery unit need to have a certificate or have national credentialing in electronic fetal monitoring.
  - Routine continued education on interpretation

Tracing Interpretation & Management

Management of fetal heart tracings

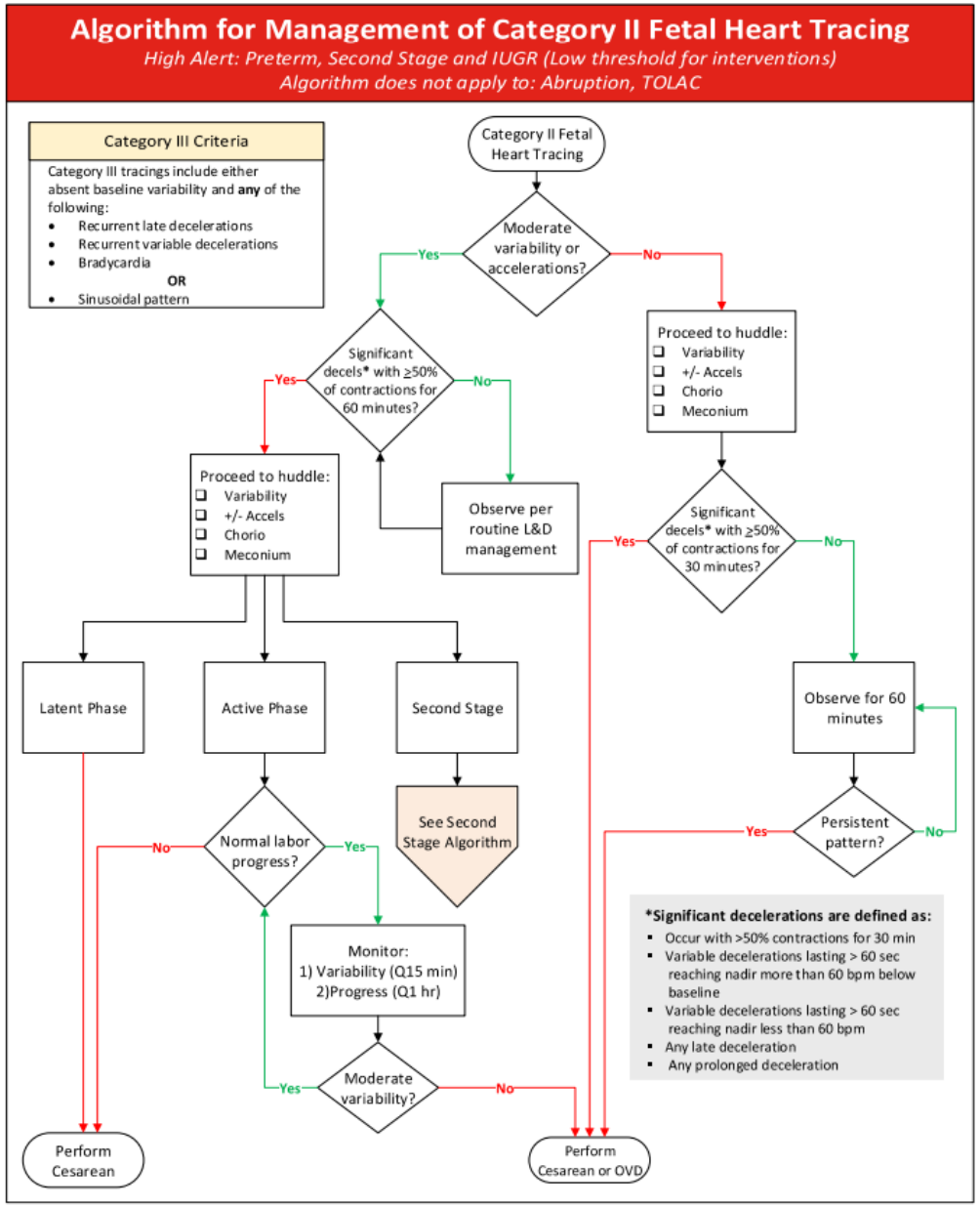
Identification of tracing category

Category II Tracings:

- Intrauterine Resuscitative Measures
- Interdisciplinary huddles
- Interdisciplinary tracing rounds – every three hours
- Use of the Category II Algorithm

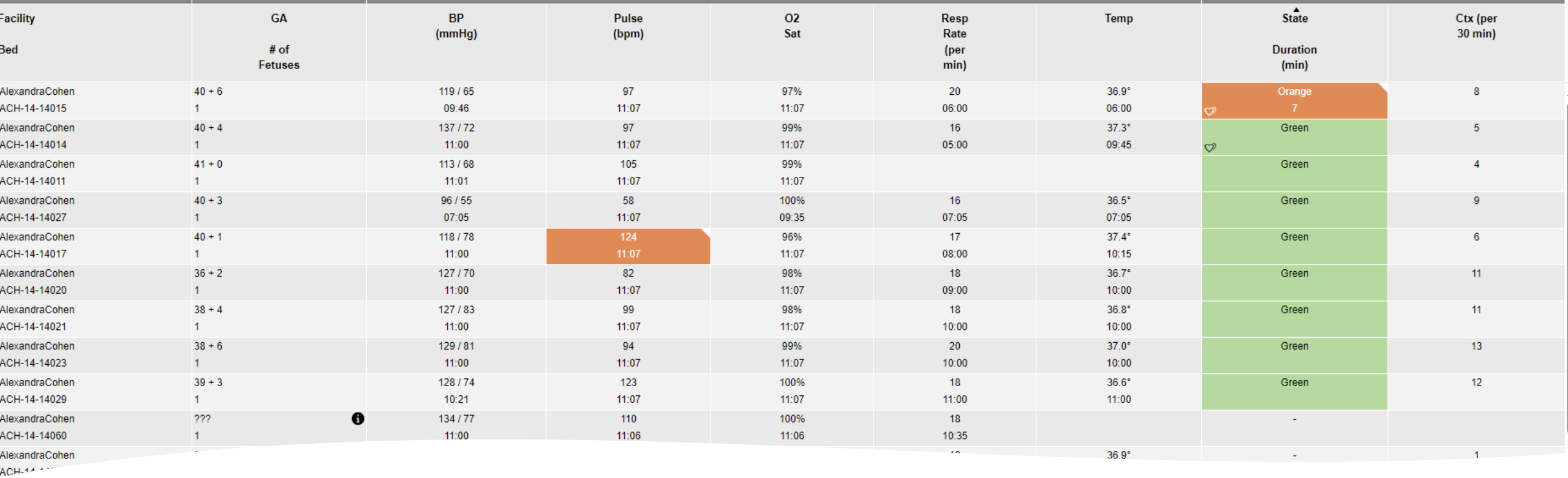
Category III Tracings:

- Imminent delivery
- Cesarean Section



Gap Analysis

- Gaps identified that contribute to negative patient outcomes:
  - Interpretation of Electronic Fetal Monitor Tracings
  - Team Situational Awareness
    - Alexandra Cohen Hospital – Size
  - Timely intervention for Category II and III fetal tracings
  - Communication between the interdisciplinary team members



Facility / Bed	GA / # of Fetuses	BP (mmHg)	Pulse (bpm)	O2 Sat	Resp Rate (per min)	Temp	State / Duration (min)	Ctx (per 30 min)
AlexandraCohen ACH-14-14015	40 + 6 1	119 / 65 09:46	97 11:07	97% 11:07	20 06:00	36.9° 06:00	Orange 7	8
AlexandraCohen ACH-14-14014	40 + 4 1	137 / 72 11:00	97 11:07	99% 11:07	16 05:00	37.3° 09:45	Green	5
AlexandraCohen ACH-14-14011	41 + 0 1	113 / 68 11:01	105 11:07	99% 11:07			Green	4
AlexandraCohen ACH-14-14027	40 + 3 1	96 / 55 07:05	58 11:07	100% 09:35	16 07:05	36.5° 07:05	Green	9
AlexandraCohen ACH-14-14017	40 + 1 1	118 / 78 11:00	124 11:07	96% 11:07	17 08:00	37.4° 10:15	Green	6
AlexandraCohen ACH-14-14020	36 + 2 1	127 / 70 11:00	82 11:07	98% 11:07	18 09:00	36.7° 10:00	Green	11
AlexandraCohen ACH-14-14021	38 + 4 1	127 / 83 11:00	99 11:07	98% 11:07	18 10:00	36.8° 10:00	Green	11
AlexandraCohen ACH-14-14023	38 + 6 1	129 / 81 11:00	94 11:07	99% 11:07	20 10:00	37.0° 10:00	Green	13
AlexandraCohen ACH-14-14029	39 + 3 1	128 / 74 10:21	123 11:07	100% 11:07	18 11:00	36.6° 11:00	Green	12
AlexandraCohen ACH-14-14060	??? 1	134 / 77 11:00	110 11:06	100% 11:06	18 10:35		-	
AlexandraCohen ACH-						36.9°	-	1

Initial Perigen Implementation

- Alexandra Cohen Hospital
  - Went Live: March 14, 2023
- Enterprise-wide, mandatory education for all Labor and Delivery (L&D) providers
  - Any team member who interprets a fetal tracing on L&D
- Daily huddle messages with nursing team
- Demonstration at AM/PM Team Sign-out
- Email saturation
- Onsite Perigen Support

Challenges

- Culture Shift
  - Lack of use
  - Comfortability with previous system (OB TraceView)
- Implementation Silos
- Reluctance to AI
  - Distrust/misuse of color cues (category VS color cue)
- Perception
  - Decrease in nursing autonomy

Assessment of use – August 2023

Was PeriGen utilized during rounds?

41 responses

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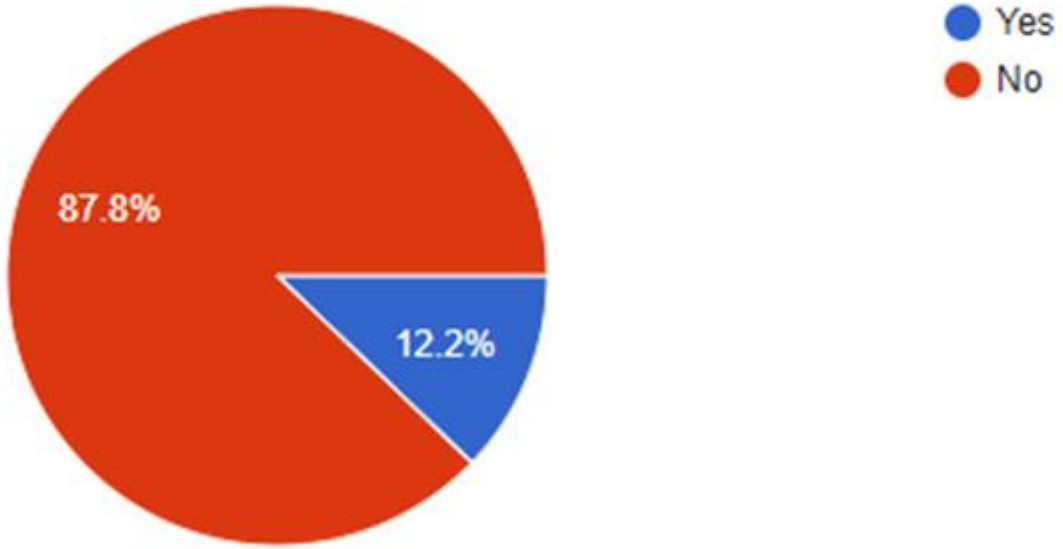


Usage Data – Opening of Single Patient View

Parameters: Between FromDate: 8/1/2023 and ToDate: 10/31/2023

Site Name	Positive Events	SPV Opening
AlexandraCohen	1693	9877

Re-implementation Period
September 2023

Changes to our Implementation Approach

- Supported by our Quality and Patient Safety Team
  - Site visits
  - Team conversations
    - Thoughts on the tool
    - Ways to improve use
    - Troubleshooting
- Regroup with the multidisciplinary team
- Re-review of fetal tracings for newborns admitted to the NICU for cooling
  - Compared the documentation of those tracings to the Perigen Cue State
    - OB Chair and Vice Chair, Medical Director, Chair of Quality Assurance and Patient Safety, Patient Care Director of L&D, Patient Safety Nurse
- Sharing success stories from our own team members
- Re-demonstrated multi-use functions and access points
- Team re-alignment to our goals (preventing injury)

Perigen in Daily Workflows

- Change of Shift Huddle
- Q3 hour tracing rounds
- Any time an ad hoc huddle is called to discuss a concerning tracing

Change of Shift Team Sign-Out – Phase 1

- Multidisciplinary Sign-Out AM + PM
  - Re-enforced use of PeriGen 9/18 of this year
  - Reviews all patients on the unit, inductions to come in, and cesarean sections planned for the day.
  - Team includes: OB attendings, OB Residents, OB & Nursing leadership, OB PA team, nursing team, anesthesia team, MFM, neonatologists
- PeriGen implementation
  - Room order
  - PeriGen tracings are opened coinciding with the patient being discussed
  - PGY-1 resident launches PeriGen & controls the screen
  - Team creates plan and increased situational awareness

Q3 Hour Tracing Rounds & Ad-Hoc – Phase 2

- Minimum attendance – Charge RN & Chief Resident / Charge OB PA
  - Preferred if include Laborist/Attending and both the Chief Res & Charge PA
- Review of all tracings to identify any Cat II tracing
- Done q3 hours: 10:30, 13:30, 16:30, 22:30, 01:30, 04:30

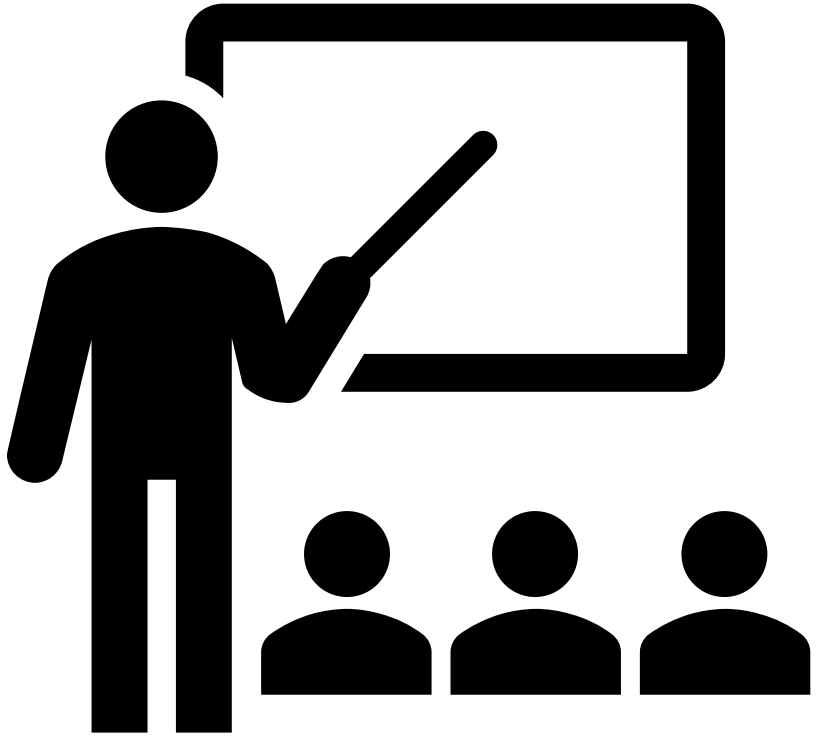
- <u>Perigen implementation</u>
  - Review of tracings through PeriGen, noting cues state
  - Validate the cues state
    - Discussions on agreement/disagreement
    - Plan of care determined
    - Cat II Algorithm used

Cat II Identification

- OB Floor Resident contacts appropriate attending provider Via Epic Secure Chat
- Huddle with team occurs within 10 minutes of notification
- If during AM/PM Sign out: huddle occurs immediately after (unless patient safety is at risk)
- Cat II Algorithm is to be used
- Cat II Huddle note reinforced

Re-Education Efforts

- Management of Cat II Tracings
  - The Cat II Algorithm
- Huddles
  - Collaboration for tracing interpretation and management
- Use of Perigen as:
  - Alert system
  - Support



QR Code

Tracing Rounds

You do NOT need to sign in to submit :)

cohensafety.psn@gmail.com Switch account

Not shared

* Indicates required question

Who is initiating this round? *

- Nurse
- PA
- Resident
- Attending

Date Tracing Round occurred: *

Your answer

Time Completed *

- 1030 (AM)
- 1330 (PM)
- 1630 (PM)
- 2230 (PM)
- 0130 (AM)
- 0430 (AM)

Those Attended *

- Charge Nurse
- Charge PA
- Chief Resident
- Laborist
- Attending (Not the Laborist/Staff Attending)

Category II Tracing Identified

- Yes
- No

Cat II Algorithm Used

- Yes
- No

Was Primary/Covering Attending Notified

- Yes
- No

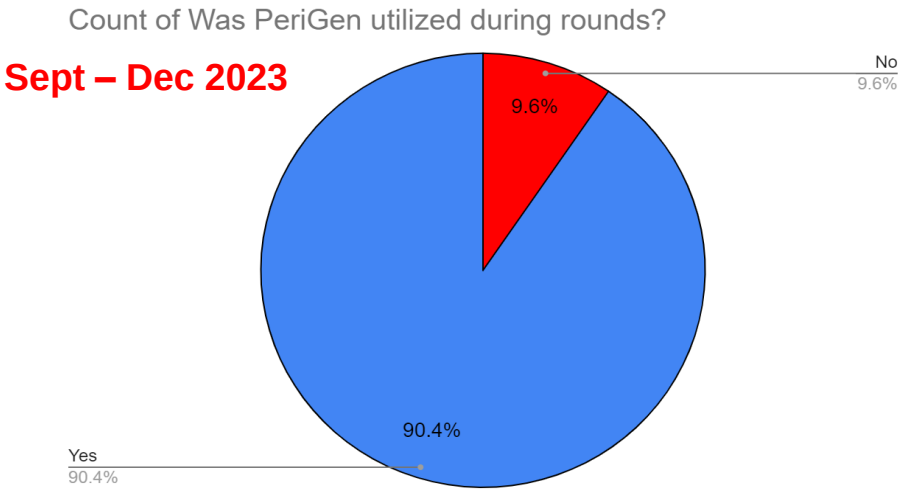
Was PeriGen utilized during rounds? *

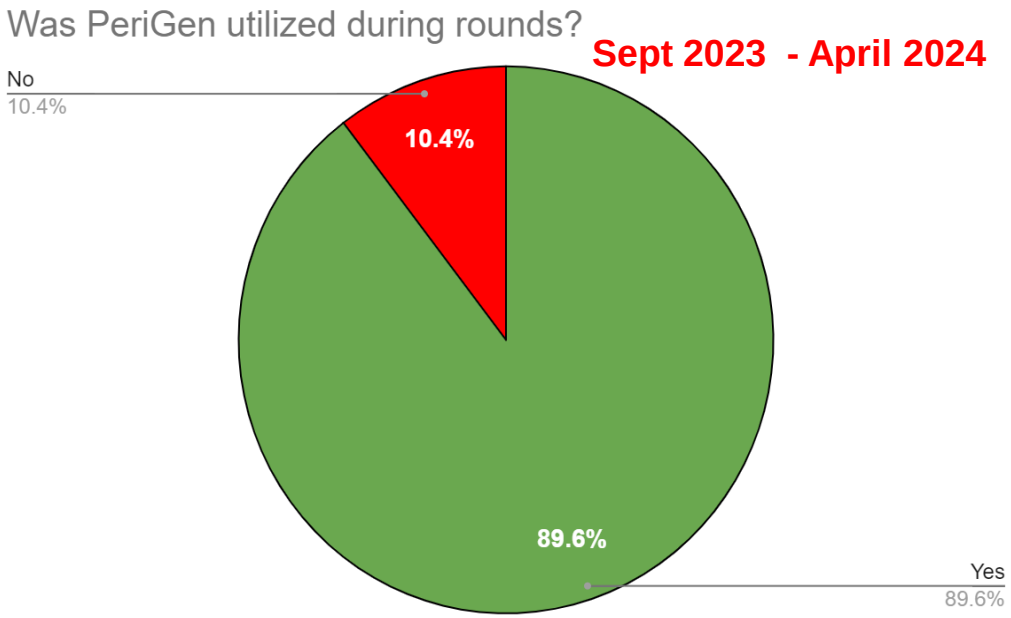
- Yes
- No

NewYork-Presbyterian

Current State

- Culture change – Perigen used for morning and evening team sign-out daily (100% compliance)
- Increased user interface tenfold
- Notifications triggered while the Single Patient Dashboard was already open has **more than doubled.** This means PeriGen is being actively used/opened and not only when notifications are received
- In the first three months post reinforcement of Perigen
  - Multidisciplinary effort





Usage Data – Opening of Single Patient View

Parameters: Between FromDate: 11/1/2023 and ToDate: 1/1/2024

Site Name	Positive Events	SPV Opening
AlexandraCohen	1124	10461

Increase from 5.8 per positive event to 9.3 per positive event!

Looking forward...

- Sustainability
- Monitor neonatal cooling and encephalopathy cases
- Assessment of maternal injury improvements
  - Improved treatment times for HTN
  - Sepsis prevention
- Continuous feedback from team on technology glitches
  - Areas for improvement

References

1. Aslam, S., Strickland, T., & Molloy, E. J. (2019). Neonatal Encephalopathy: Need for Recognition of Multiple Etiologies for Optimal Management. *Frontiers in pediatrics*, *7*, 142. https://doi.org/10.3389/fped.2019.00142

2. Arnold, J. J., & Gawrys, B. L. (2020). Intrapartum Fetal Monitoring. *American family physician*, *102*(3), 158–167.

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4. Wu, Y. (2024). Clinical features, diagnosis, and treatment of neonatal encephalopathy. *UpToDate*. Retrieved from: Clinical features, diagnosis, and treatment of neonatal encephalopathy - UpToDate