Reducing rates of newborn hypothermia by maintaining OR temperatures at 77 ºF during Cesarean Sections

Unified Quality Improvement Symposium 2018

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Making eastern North Carolina a better place to born!

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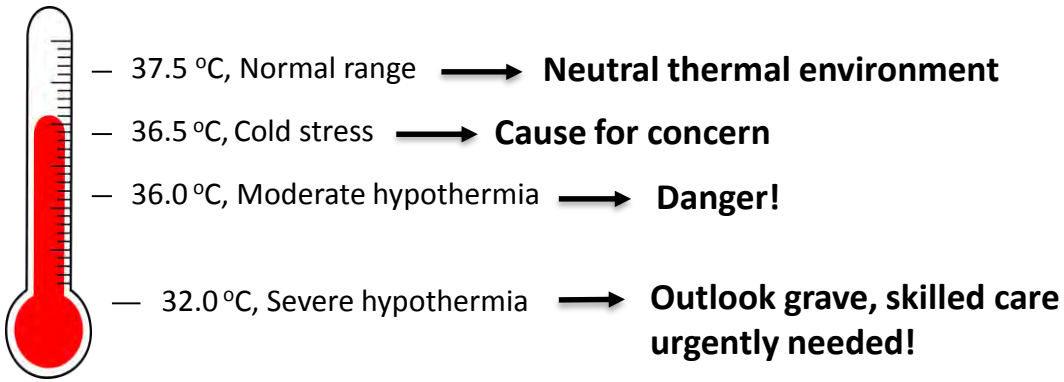
VIDANT HEALTH

Define: Hypothermia of the newborn

Hypothermia in newborns: Defined as a core temperature **< 36 to 36.5 °C**



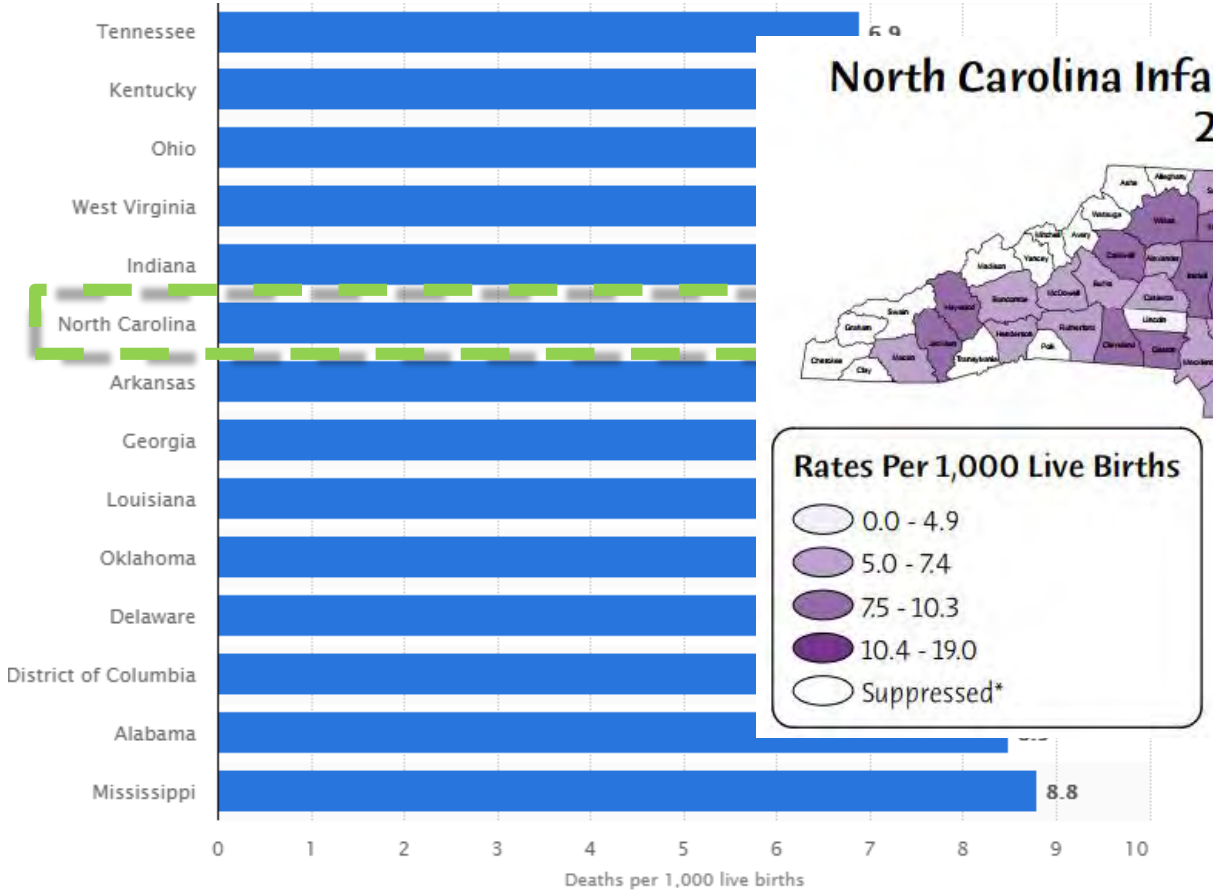
- The newborn regulates body temperature much less efficiently and loses heat more easily
- The smaller and more premature the baby, the greater the risk
- After birth, the wet newborn immediately starts to lose heat
  - Larger surface area per unit body weight
  - Decreased thermal insulation due to lack of subcutaneous fat in low birth weight infants
  - Reduced amount of brown fat in low birth weight infants
- Contributes to complications such as respiratory distress, bradycardia, hypotension, and intraventricular hemorrhage

The temperature of the environment during delivery and the postnatal period has a significant effect on the risk to the newborn of developing hypothermia

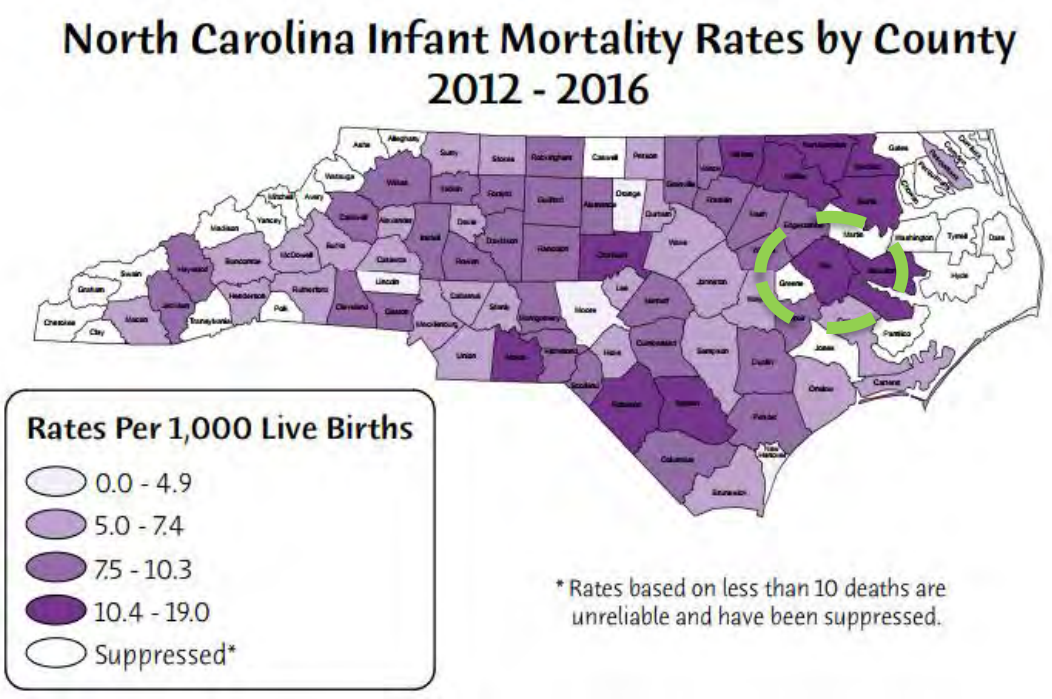
Background

Neonatal Mortality Rates: North Carolina and Pitt County

According to the National Center for Health Statistics, North Carolina's neonatal mortality rate is one of the highest in the country. Eastern North Carolina's mortality rate is one of the worst in the state.



Infant mortality rate in the United States as of 2017, by state (deaths per 1,000 live births)
Source: National Center for Health Statistics, CDC

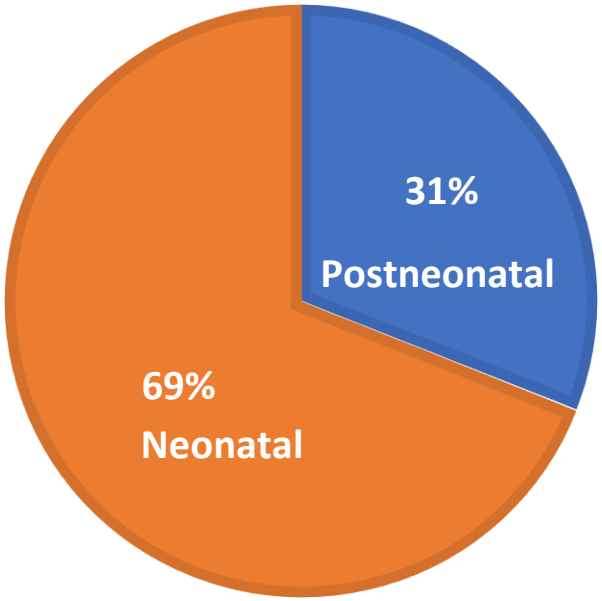


Source: North Carolina State Center for Health Statistics

Neonatal Mortality Rate: Age of death

Among the leading causes of North Carolina's infant mortality rate are prematurity and low birth weight, congenital malformations, maternal complications of pregnancy and labor and delivery, and other perinatal conditions – which includes development of hypothermia in the newborn.

INFANT DEATHS BY AGE AT DEATH IN NORTH CAROLINA, 2014



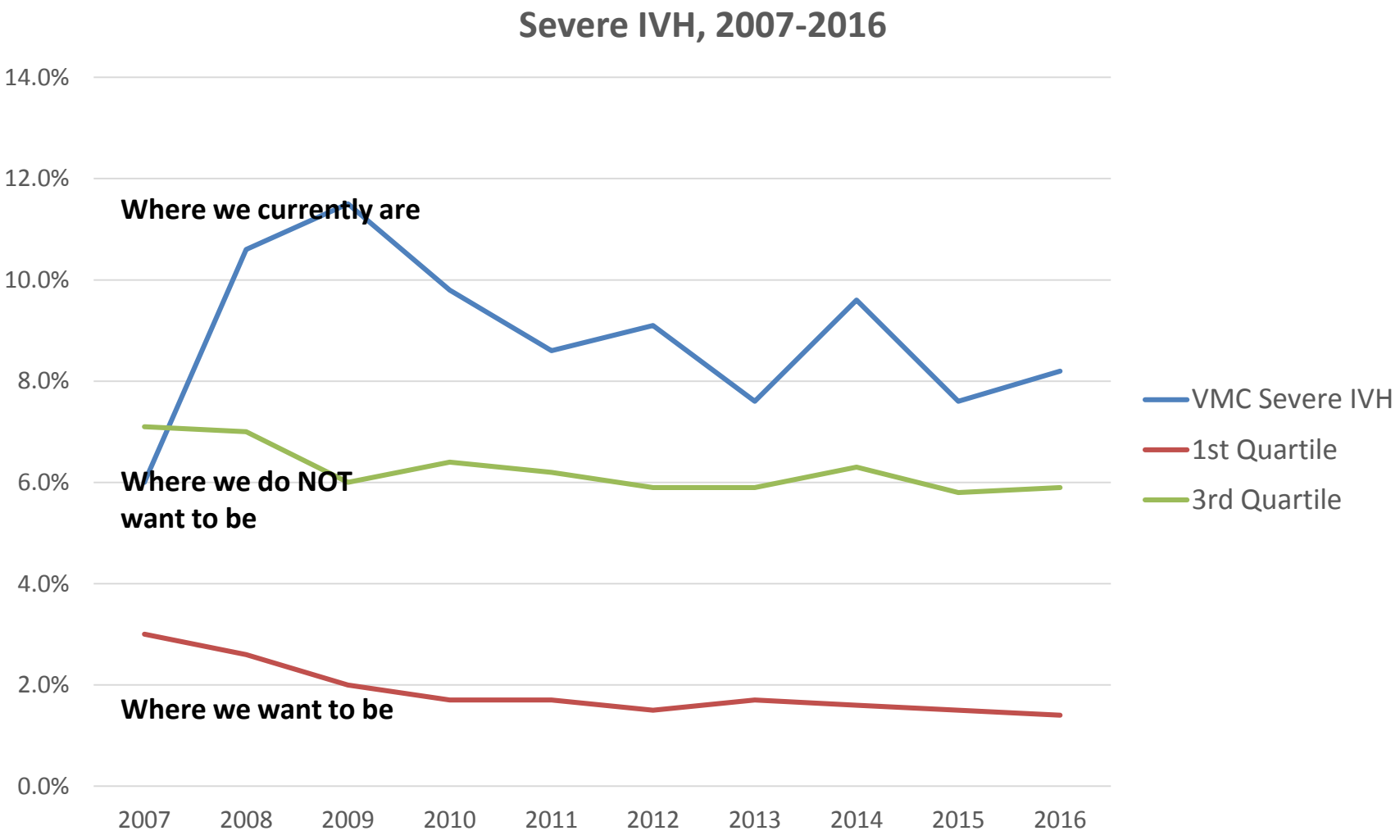
- **More than 2/3** of infant deaths occur in the **first** 28 days of life
- Thus, 2/3 of infant deaths are as much an **obstetrical issue** as they are a pediatric issue

- Neonatal (<28 days) infant deaths per 1,000 live births
- Postneonatal (≥28 days) infant deaths per 1,000 live births minus neonatal deaths.

Source: State Center for Health Statistics

Thus, almost 70% of the state's neonatal mortality is caused by obstetrical issues. Therefore, as OB/GYNs, we have to reduce our neonatal mortality rate.

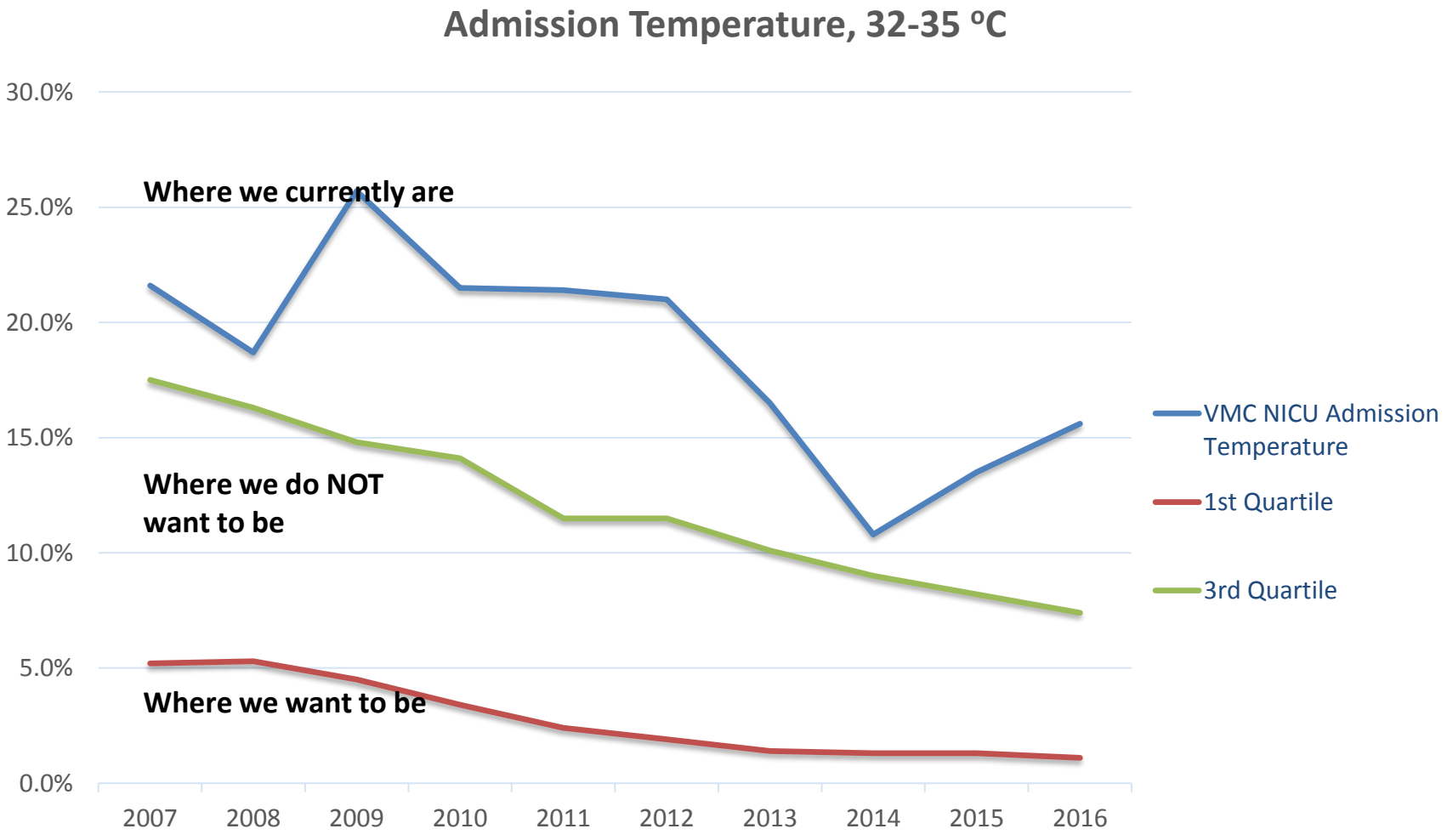
Vidant Medical Center: Severe Intraventricular Hemorrhage



Source: Vermont Oxford Network

Our rates of severe intraventricular hemorrhage are not where we want them to be – why?

Vidant Medical Center: Rates of Admission Temperature to the NICU



Source: Vermont Oxford Network

Hypothermia in newborns contributes to complications such as respiratory distress, bradycardia, hypotension, and **intraventricular hemorrhage**

Our proposed solution

The Warm Chain: Thermal protection of the newborn

The World Health Organization (WHO) developed the "warm chain" which is a set of ten interlinked procedures carried out at birth and during the following hours and days which will minimize the likelihood of hypothermia in all newborns.

1. Warm delivery room
2. Warm resuscitation
3. Immediate drying
4. Skin-to-skin contact
5. Breastfeeding
6. Bathing postponed
7. Appropriate clothing
8. Mother and baby together
9. Professional alert
10. Warm transportation

Preparation of the place of delivery and of the supplies that will be needed is the first step of the warm chain. The room should be clean, warm, at least 77 ^{o}F (25 ^{o}C), and free from drafts from open doors or from fans.

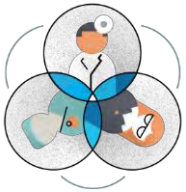
AIM Statement: What is our goal?

Global Aim

- To reduce the incidence of newborn hypothermia at Vidant Medical Center
- Vidant Medical Center has improved the incidence of hypothermia in low birth weight infants after the implementation of the “Golden Hour” protocol
- However, VMC continues to struggle with hypothermia in newborns, especially infants greater than 1500 grams
- Our project seeks to reduce these rates by maintaining the operating room temperatures at the recommended temperature of 77 ^{o}F (25 ^{o}C) at the time of delivery

Specific Aim

Our aim is to increase the number of labor and delivery operating rooms that maintain a temperature of 77 ^{o}F (25 ^{o}C) during cesarean sections by 50% by June 2018.

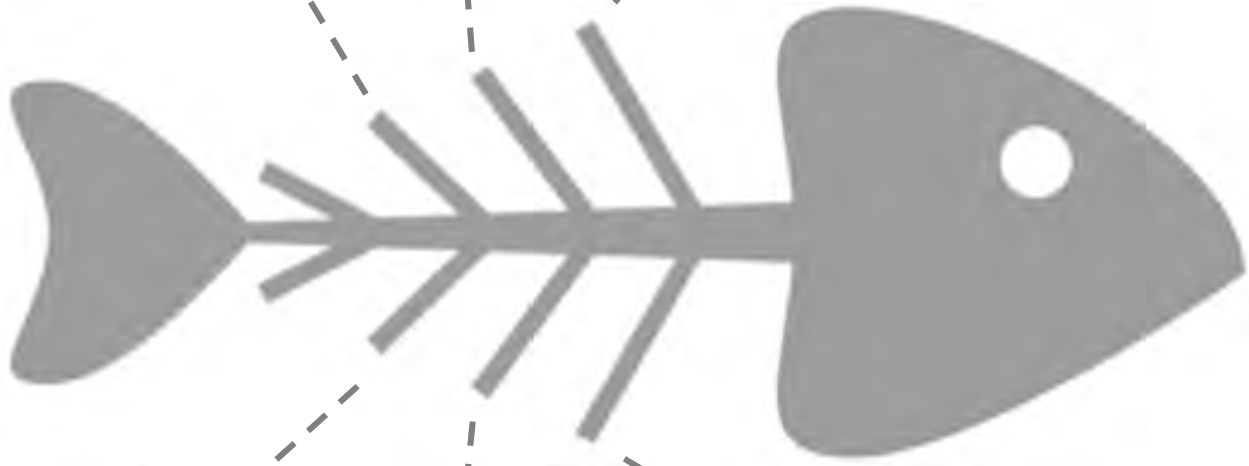


The Team

- Pooja Sarin, LINC Scholar, MS3
- Dr. James deVente, L&D Medical Director
- Angela Still, RN, Women’s Center Administrator
- OBGYN clerkship, cohorts 3 and 4, third-year medical students

Fishbone Diagram: Identifying root causes

The team conducted an assessment to identify the current approach to preparing the labor and delivery operating rooms during scheduled cesarean sections and identified several barriers within the system to maintaining the recommended temperature of 77 °F (25 °C) at the time of delivery.



No thermometers that clearly display the OR's temperature

No specific role that is designated to control the OR temperature

Adjusting the thermostat is not part of the routine preparation of L&D ORs

Barriers to maintain the recommended temperature of 77 °F (25 °C) during the time of delivery

Thermostats do not have upper and lower limits

Provider and staff discomfort with hot operating rooms

Bystander effect – OB/GYNs know that the NICU is also responsible for preventing hypothermia of the newborn

Performance Measures: How will we know if we have been an improvement?

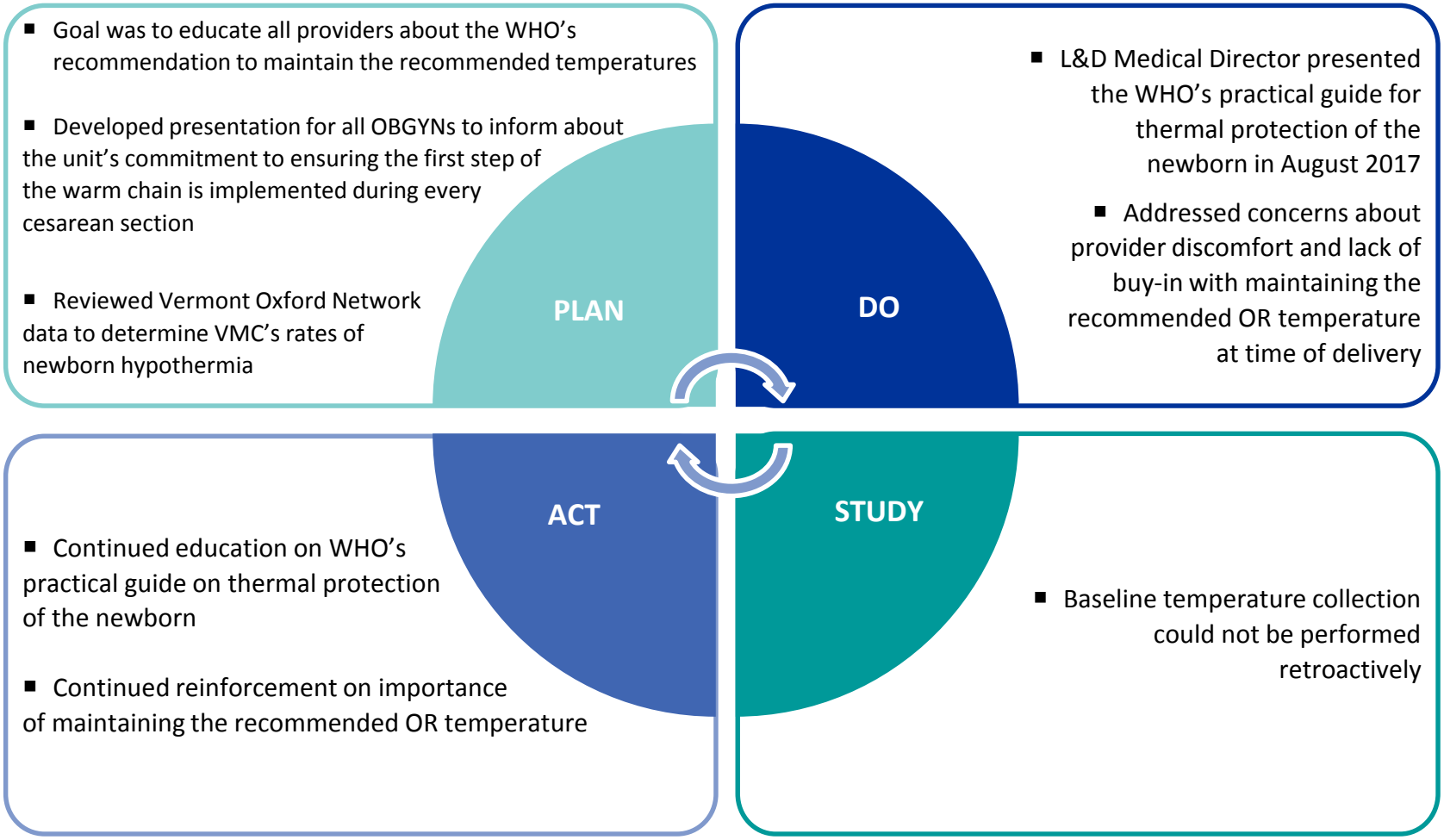
- VMC's admission temperatures and rates of severe intraventricular hemorrhage are not at our goal
- There are many variables that lead to hypothermia in the newborn

- Current rate of L&D ORs at 77 ^{o}F (25 ^{o}C) vs. rate of L&D ORs at 77 ^{o}F (25 ^{o}C) at time of delivery in June 2018

- Continue to measure compliance after each PDSA cycle

PDSA #1: Provider Education

One of the barriers to maintaining the recommended temperature of labor and delivery operating rooms during scheduled cesarean sections was lack of education that the WHO's recommendation applies to all deliveries, regardless of gestational age.



PDSA #2: Thermometers and thermostats

Another barrier to maintaining the recommended temperature of labor and delivery operating rooms during scheduled cesarean sections was there was no visible thermometer that displayed the room's temperature and the thermostats' limits were inadequate.

PLAN

- Goal was to visually display temperature in OR and to allow staff to adjust temperature to cooler temperatures after delivery and prevent OR from reaching above 77 °F (25 °C)
- Purchased thermometers to place in each L&D OR to display the environmental temperature

DO

- Placed thermometers in each L&D OR next to the thermostat in an easily visible location
- Removed governor from thermostat that was previously set at 70 °F to 68 °F
- Placed an upper limit temperature governor at 77 °F

STUDY

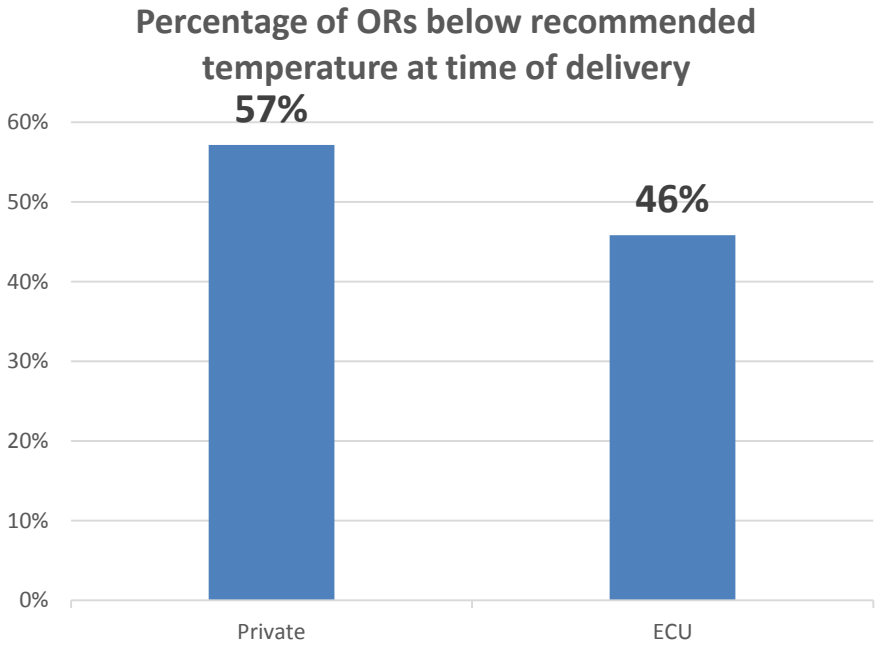
- Collaborated with MS3s on the OB/GYN clerkship to record temperatures at the time of delivery for all scheduled cesarean sections
- Initial results indicated the current rate of adherence was 52%

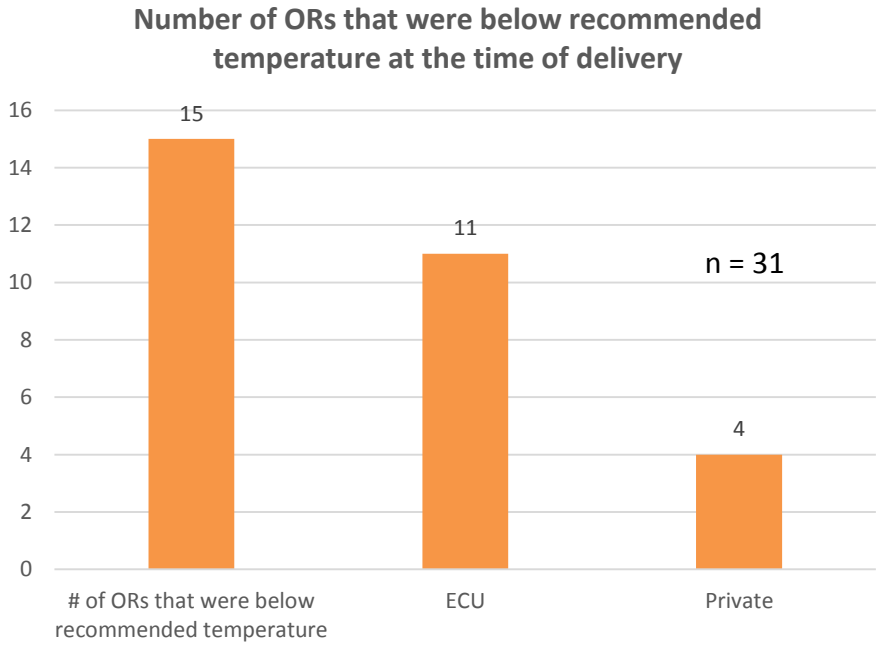
ACT

- Develop improved data collection system
- Continued reinforcement on importance of maintaining recommended OR temperature

Data Collection: Initial results

Initial data collection following PDSA cycle #2 indicate that **48%** of the scheduled cesarean sections that were sampled were set **below** the recommended temperature of 77 ^{o}F (25 ^{o}C) at the time of delivery





Limitations and Next Steps

Next Steps

- Expand team to include scrub techs, CRNAs, circulating nurses, IT
- The next PDSA cycle will be to include the temperature at the time of delivery as a part of the delivery summary for every cesarean section

Limitations

- Requested IT to update electronic medical record to include temperature at time of delivery as a part of the patient's record but have been unable to implement due to IT delays
- Data collection is currently restricted and relies on medical students to record temperatures
- Sample size is limited to cesarean sections that medical students are able attend
- Unable to establish baseline data following implementation of PDSA cycle #1

Questions?

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