



EMORY

ROLLINS  
SCHOOL OF  
PUBLIC  
HEALTH

# Critical Clinical Processes for Newborns

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**Health Policy & Management**

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# Learning Objectives

1. Discuss critical transitions in the first hour of life for extremely low birth weight infants
2. Temperature control as an example of care process improvement early in life
3. Discuss risks for opioid-exposed infants
4. Discuss process improvement of discharge transition for opioid-exposed infants





Order Code  
Order details

NR (Do Not Resuscitate)

Limited Resuscitation

Signs

Vital Signs

Routine, As directed, Starting today at 1519, Until Specified  
NICU guidelines.

Cardiac monitoring

Routine, Continuous, Starting today at 1520, Until Specified

Monitor respirations

Routine, Every 4 hours, First occurrence today at 1600, Until Specified  
Record respiratory support settings with vital signs.

Warming

Warming Assessments

Assess Pain

Routine, Every shift, First occurrence today at 1520, Until Specified

Warming Interventions

Midline Positioning with AP CXRs ⓘ

Care Instructions: For babies Not on ECMO: RN to hold midline positioning with every AP chest x-ray.

Routine, Until discontinued, Starting today at 1520, Until Specified

Open bed warmer

Care Instructions: Open bed warmer

Routine, Until discontinued, Starting today at 1520, Until Specified

Pulse Oximetry

Routine, Continuous, Starting today at 1520, Until Specified

Kangaroo care

Care Instructions: Kangaroo care per guidelines: All stable infants except with UAC, thoracostomy, and a parent with skin  
Routine, Until discontinued, Starting today at 1520, Until Specified

Implement safe sleep practices when infant meets considerations per NICU Safe Sleep Standard Operating  
Routine, Continuous, Starting today at 1520, Until Specified

Oral Immune Therapy with EBM

Care Instructions: If Not bottle feeding or breastfeeding, provide Oral Immune Therapy at every care time. Administer  
Routine, Until discontinued, Starting today at 1520, Until Specified

POC Lab: Glucose

### Order Sets

- Oral Immune Therapy with EBM  
Care Instructions: If Not bottle feeding or breastfeeding, provide Oral Immune Therapy at every care time. Administer 0.1 mL  
Routine, Until discontinued, Starting today at 1520, Until Specified
- POC Lab: Glucose  
Test for: Glucose  
Routine, As directed, Starting today at 1519, Until Specified  
Blood glucose per NICU Protocol Upon admission, then q 1 hour until 2 are between 45 and 120 mg/dL; 2 hours after any room  
NNP/MD of any value outside of ranges.
- NICU MRSA Prevention Order Panel
- NICU Lines Order Panel
  - Peripheral Line Order Panel
    - Peripheral IV Care
    - Peripheral IV care  
Care Instructions: Peripheral IV care per policy  
Routine, Until discontinued, Starting today at 1520, Until Specified
    - Umbilical Line Order Panel
    - CVC Order Panel
    - PICC Order Panel
    - PICC Removal Panel
- ⚠ Hearing Screening
  - Newborn Hearing Screen Audiology  
Prior to discharge
  - Do not order hearing screen - reason required
- Respiratory Interventions
  - NICU Respiratory and Oxygen Therapy Orders
- IV Fluids
  - IV Fluid
    - D10W infusion  
intraVENOUS, Continuous, Starting today at 1530  
⚠ From AcuDose at ordered maintenance rate until pharmacy fluids arrive  
Infiltration/Extravasation Risk = Red (Vesicant)
  - NICU IV Fluids
    - NICU IV Fluid Orders
- Medications
  - Antibacterials
    - Ampicillin IV NICU Dosing Panel

### Order Sets

- Ophthalmics
  - erythromycin (ROMYCIN) ophthalmic ointment  
0.5 inch, both eyes, Once, Give within one hour of birth if
- ⚠ Vitamins
  - phytonadione (weight less than 600 grams)  
0.2 mg, intraMUSCULAR, Once, Starting 6/14/24, If not already
  - phytonadione (weight 600 - 999 grams)  
0.3 mg, intraMUSCULAR, Once, Starting 6/14/24, If not already
  - phytonadione (weight 1000 - 1499 grams)  
0.5 mg, intraMUSCULAR, Once, Starting 6/14/24, If not already
  - phytonadione (weight greater than or equal to 1500 grams)  
1 mg, intraMUSCULAR, Once, Starting 6/14/24, If not already
  - Do not order phytonadione - reason required
- Sucrose oral solution
  - sucrose 24 % oral solution (infants LESS than or equal to 1000 grams)  
0.05 mL, oral, 4 times daily PRN, per protocol for procedural pain
  - sucrose 24 % oral solution (infants 1-2 kg and LESS than 1000 grams)  
0.2 mL, 4 times daily PRN, per protocol for procedural pain
  - sucrose 24 % oral solution (infants GREATER than or equal to 2 kg)  
0.5 mL, 4 times daily PRN, per protocol for procedural pain
  - sucrose 24 % oral solution (infants 1-9 months: do not use)  
2 mL, oral, 4 times daily PRN, per protocol for procedural pain
- Labs
  - NICU Admission Labs
    - CBC w/ Differential ⓘ  
Once, Blood
    - CRP  
Once, Blood
    - CRP - in 24 hours  
Once, Starting H+24 Hours, Blood
    - Newborn Genetic Scrn-TDOH  
Once, today at 1520, For 1 occurrence  
Blood, Requires Epic Order & Lab Specific Requisition. See c...
    - Cord Bld Workup  
Routine, Once, today at 1520, For 1 occurrence  
Mother MRN: N/A Mother Name: N/A Perform Cord Blood Workup  
complete all steps.
    - Cord Stat Collection  
Once, today at 1520, For 1 occurrence  
Umbilical Cord, Hold segment for 7 days. Obtain 6 - 8 inch u...



>30 standard admission orders

The screenshot displays the 'Order Sets' section of an Epic EHR system. It lists several standard admission orders for a NICU patient, including:

- Oral Immune Therapy with EBM**: Care Instructions: If Not bottle feeding or breastfeeding, provide Oral Immune Therapy at every care time. Administer 0.1 mL Routine, Until discontinued, Starting today at 1520, Until Specified.
- POC Lab: Glucose**: Test for: Glucose. Routine, As directed, Starting today at 1519, Until Specified. Blood glucose per NICU Protocol Upon admission, then q 1 hour until 2 are between 45 and 120 mg/dL; 2 hours after any NNP/MD of any value outside of ranges.
- NICU MRSa Prevention Order Panel**: Unchecked.
- NICU Lines Order Panel**: Checked.
  - Peripheral Line Order Panel**: Checked.
    - Peripheral IV Care
    - Peripheral IV care**: Checked.
- PICC Removal Panel**: Unchecked.
- Hearing Screening**:
  - Newborn Hearing Screen Audiology**: Unchecked. Prior to discharge.
  - Do not order hearing screen - reason required**: Unchecked.
- Respiratory Interventions**:
  - NICU Respiratory and Oxygen Therapy Orders**: Unchecked.
- IV Fluids**:
  - IV Fluid**:
    - D10W infusion**: Checked. IntraVENOUS, Continuous, Starting today at 1530. From AcuDose at ordered maintenance rate until pharmacy fluids arrive. Infiltration/Extravasation Risk = Red (Vesicant).
  - NICU IV Fluids**:
    - NICU IV Fluid Orders**: Unchecked.
- Medications**:
  - Antibacterials**:
    - Ampicillin IV NICU Dosing Panel**: Unchecked.

On the right side of the screen, there are additional order sets for 'Ophthalmics', 'Vitamins', and 'Sucrose oral solution'. The 'Vitamins' section includes options for phytonadione based on the infant's weight (less than 600 grams, 600-999 grams, 1000-1499 grams, or greater than or equal to 1500 grams). The 'Sucrose oral solution' section includes an option for sucrose 24% oral solution (infants 1-9 months: dose 2 mL, oral, 4 times daily PRN, per protocol for procedural pain).



# If Untreated ...

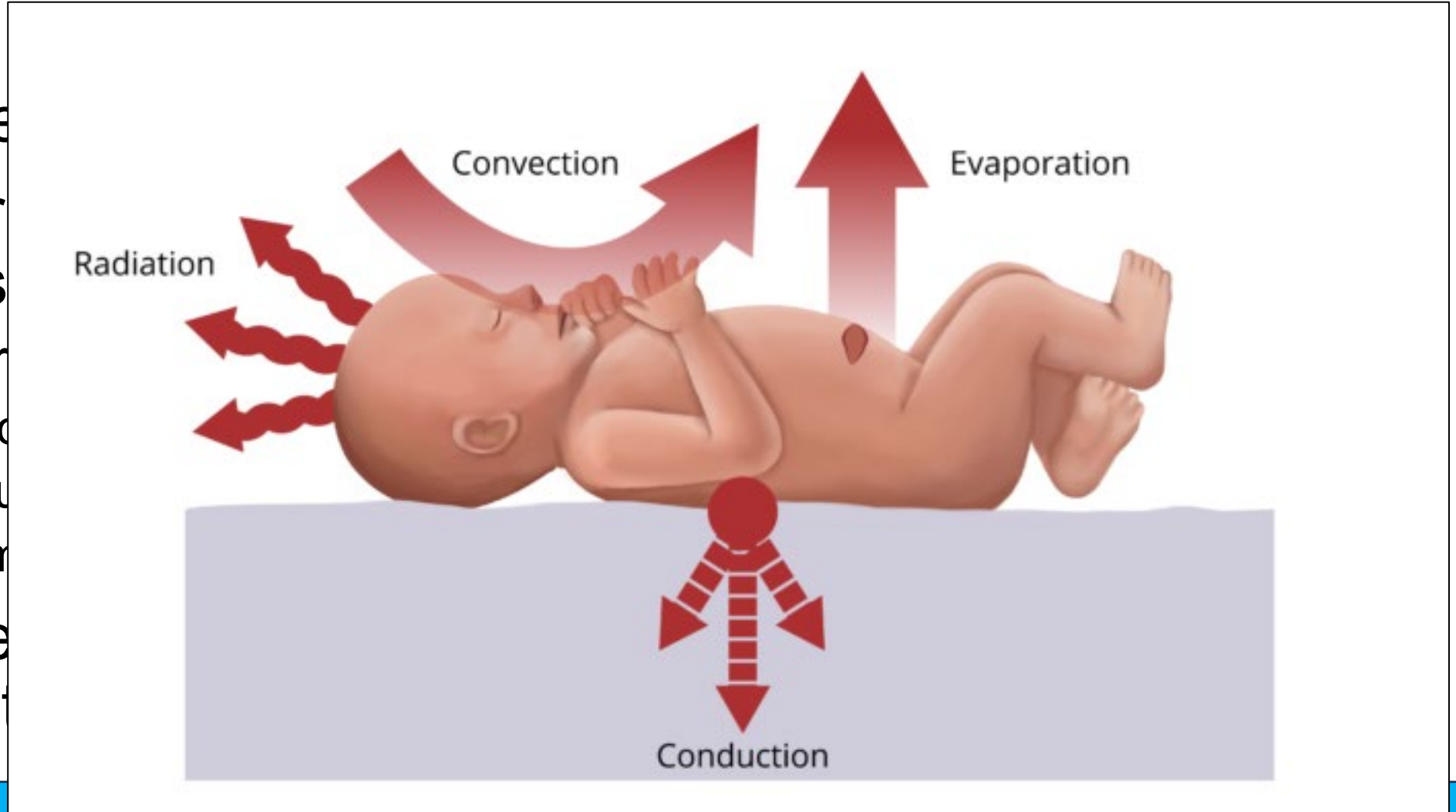
- Extremely Low Birthweight Infants (<1000g) will develop
  - Respiratory failure
  - Hypothermia
  - Hypoglycemia
- The “golden hour,” or the first hour of birth, is an optimal time to prevent these complications and avoid morbidity and mortality.

# Temperature

- Hypothermia -  $<36.5^{\circ}\text{C}$
- Newborn temperature can drop  $2^{\circ} - 4^{\circ}\text{C}$  in the first 30 minutes after delivery without intervention
  - Preterm infants
    - $>$  body surface area:body mass
    - $<$  subcutaneous fat
    - Immature vasomotor control
- In one every  $1^{\circ}\text{C}$  decrease in admission temperature is associated with a 28% increase in mortality

# Temperature

- Hypothermia
- Newborns lose heat within minutes
  - Preterm
    - $> 100$  cm
    - $< 1000$  g
    - Immature
- In one study, hypothermia was associated with





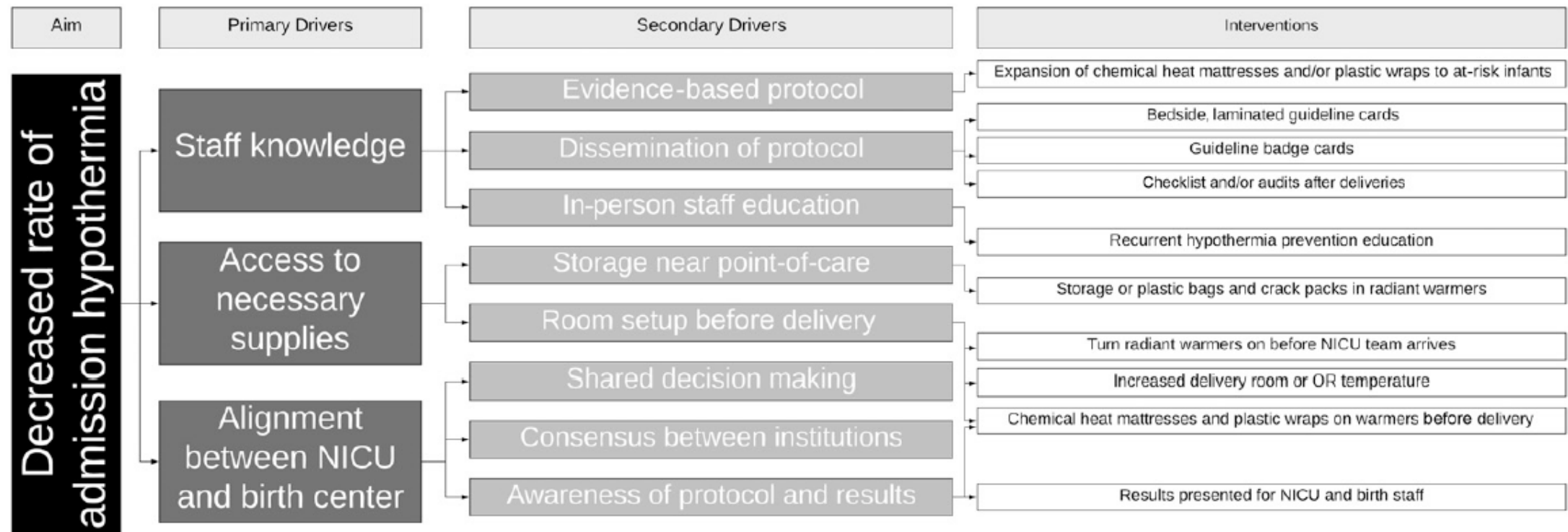
# Temperature

- Simple solutions
  - Hat
  - Blankets
  - Skin-to-skin care
  - Increase the temperature in delivery room/OR
  - Radiant warmer
  - Chemical heat mattress
  - Polyethylene bag
- Even with simple solutions, a 2016 analysis found that nearly 2/5 very low birth weight infants (<1500g)



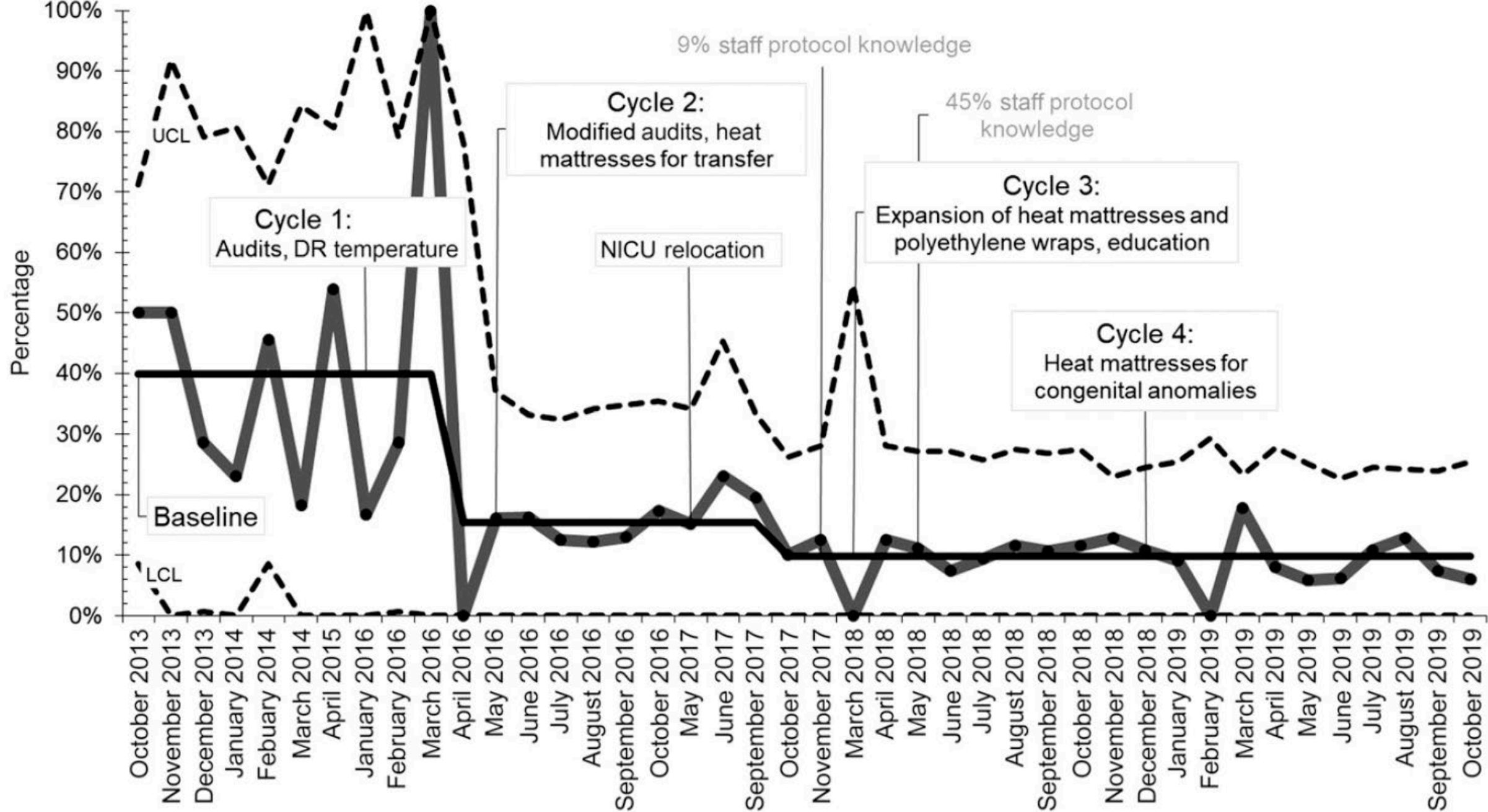


# Driver Diagram









# Opioid-Exposed Infants

- Every 15 minutes, an infant is born having opioid withdrawal in the US.
- Opioid-exposed infants are at risk for adverse post-discharge outcomes, including readmission.
- Many infants do are not connected to critical post-discharge services.
- Hepatitis C exposure common, <20% of infants tested



# Discharge Checklist

1. Schedule a pediatrician visit before discharge
2. Referral to home visitation services
3. Referral to Early Intervention Services
4. Referral to development clinic
5. If exposed to Hepatitis C, refer for follow-up

SMART Aim

We will increase successful completion of an optimal discharge checklist from 2.6% to 40% by January 5, 2019.

Key Drivers

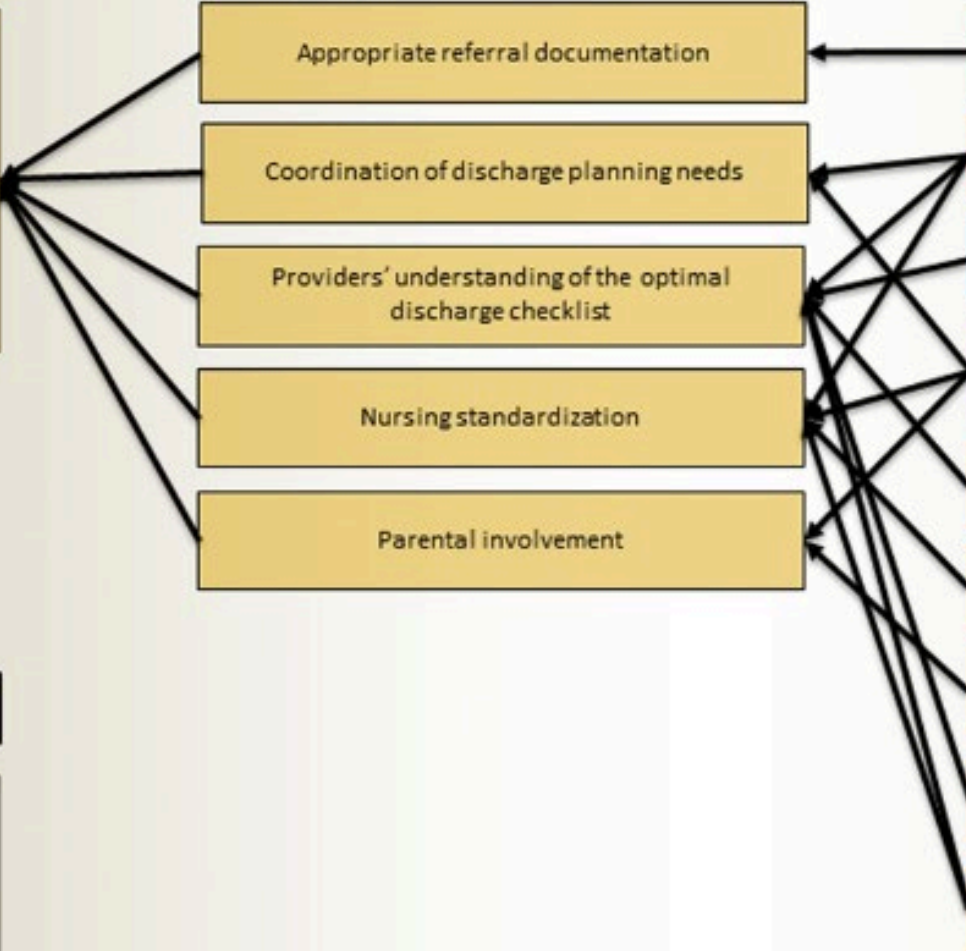
- Appropriate referral documentation
- Coordination of discharge planning needs
- Providers' understanding of the optimal discharge checklist
- Nursing standardization
- Parental involvement

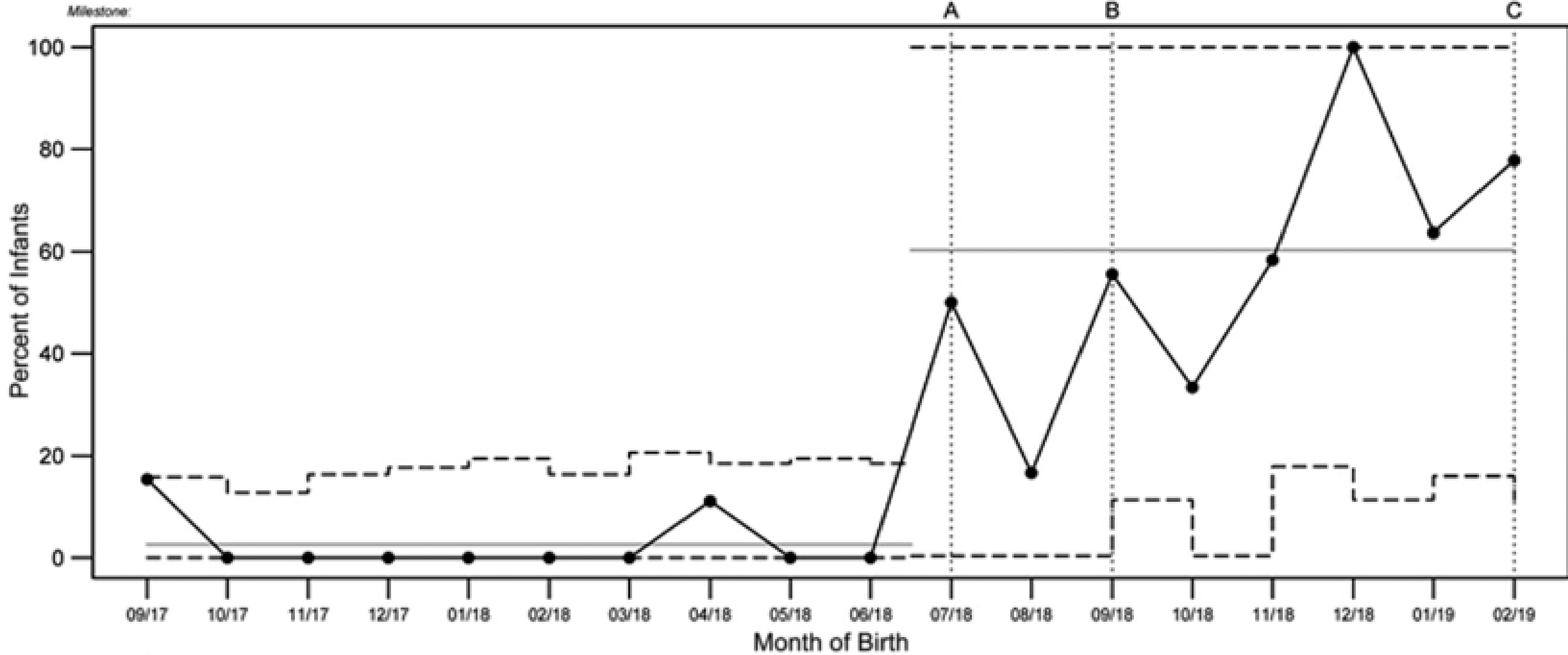
Interventions

- Documentation
- Opioid-exposed care checklist
- Education of services
- Case management education
- Hospital education
- Nurse-driven discharge stop sign
- Discharge planner
- Electronic sticky note in Epic
- Rounding table reminder

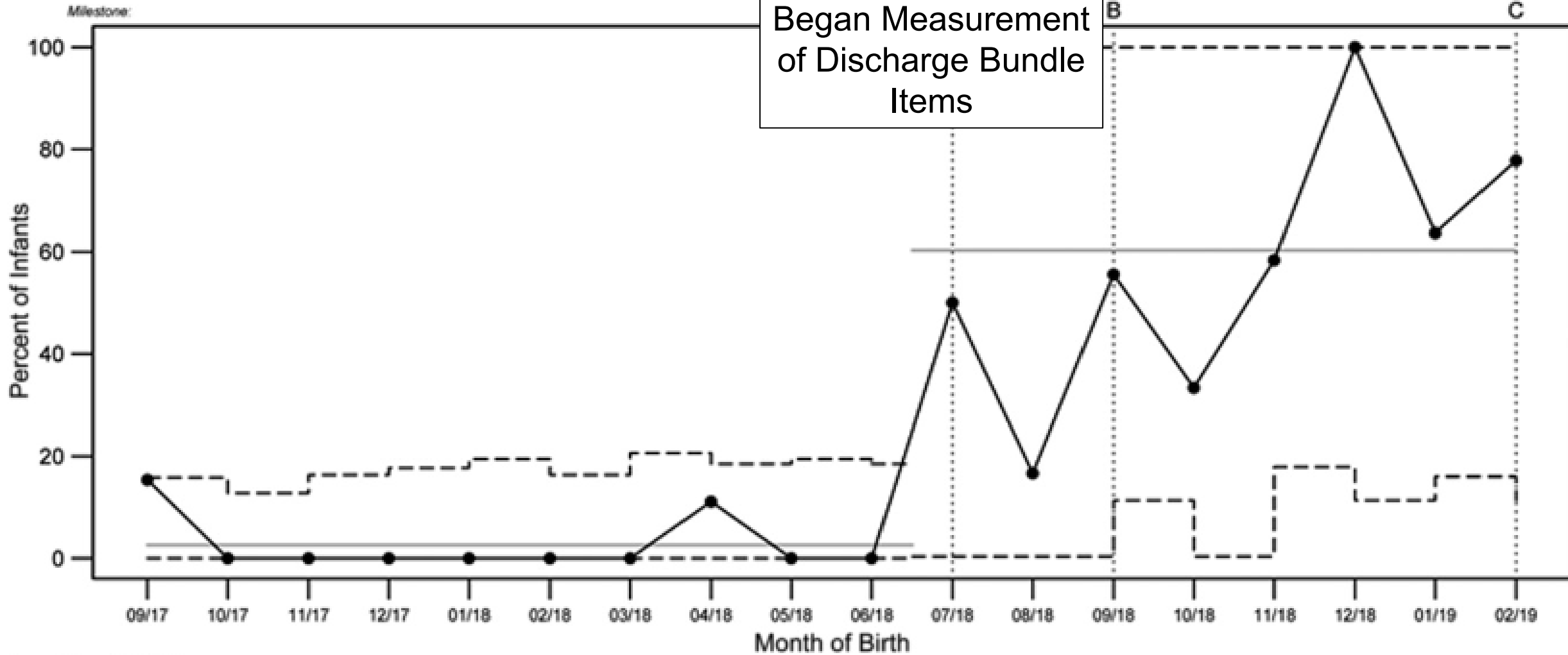
Global Aim

Be the best hospital for families to seek care for their opioid exposed neonates.



**B****Percent completion of discharge bundle****Percent (completed/total):**

15% (2/13) 0% (0/22) 0% (0/12) 0% (0/10) 0% (0/8) 0% (0/12) 0% (0/7) 11% (1/9) 0% (0/8) 0% (0/9) 50% (3/6) 17% (1/6) 56% (5/9) 33% (2/6) 58% (7/12) 100% (9/9) 64% (7/11) 78% (7/9)

**B****Percent completion of discharge bundle**

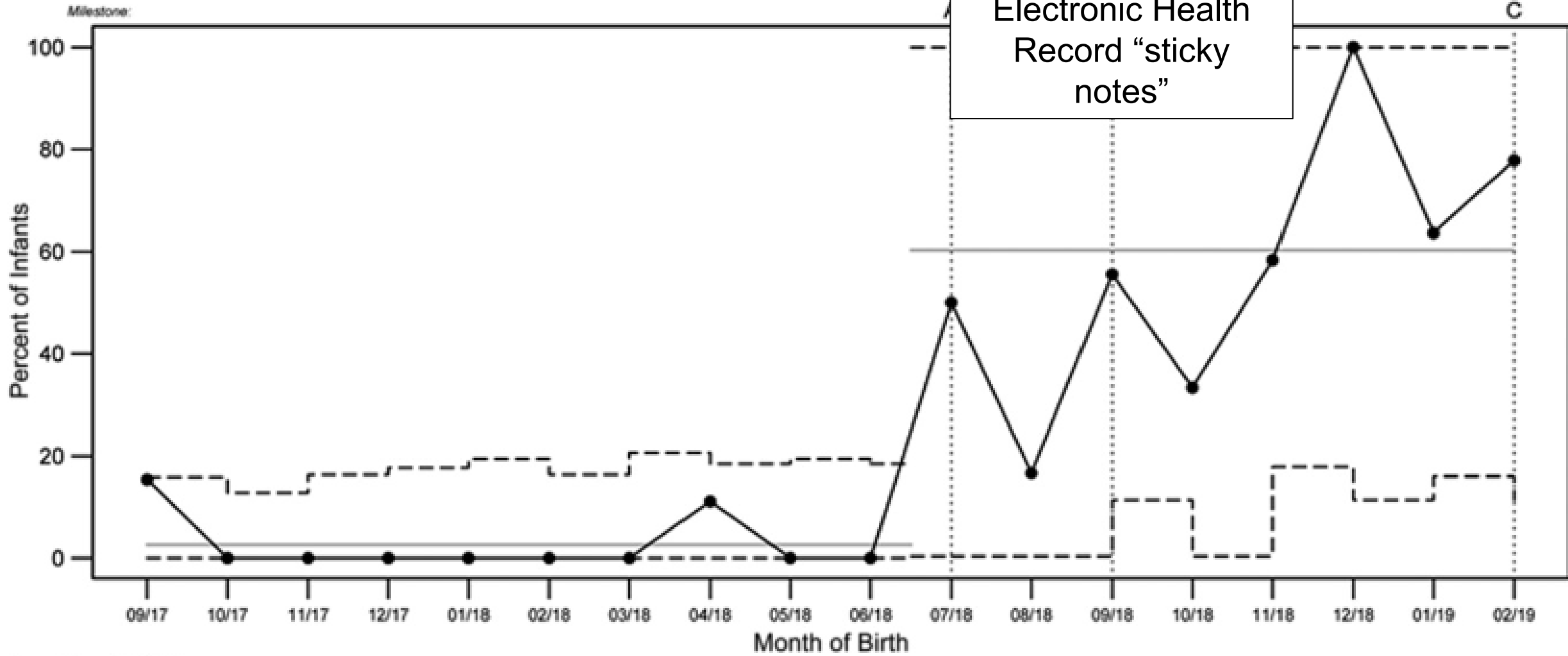
Percent (completed/total):

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**B****Percent completion of discharge**

Resident education,  
Electronic Health  
Record “sticky  
notes”

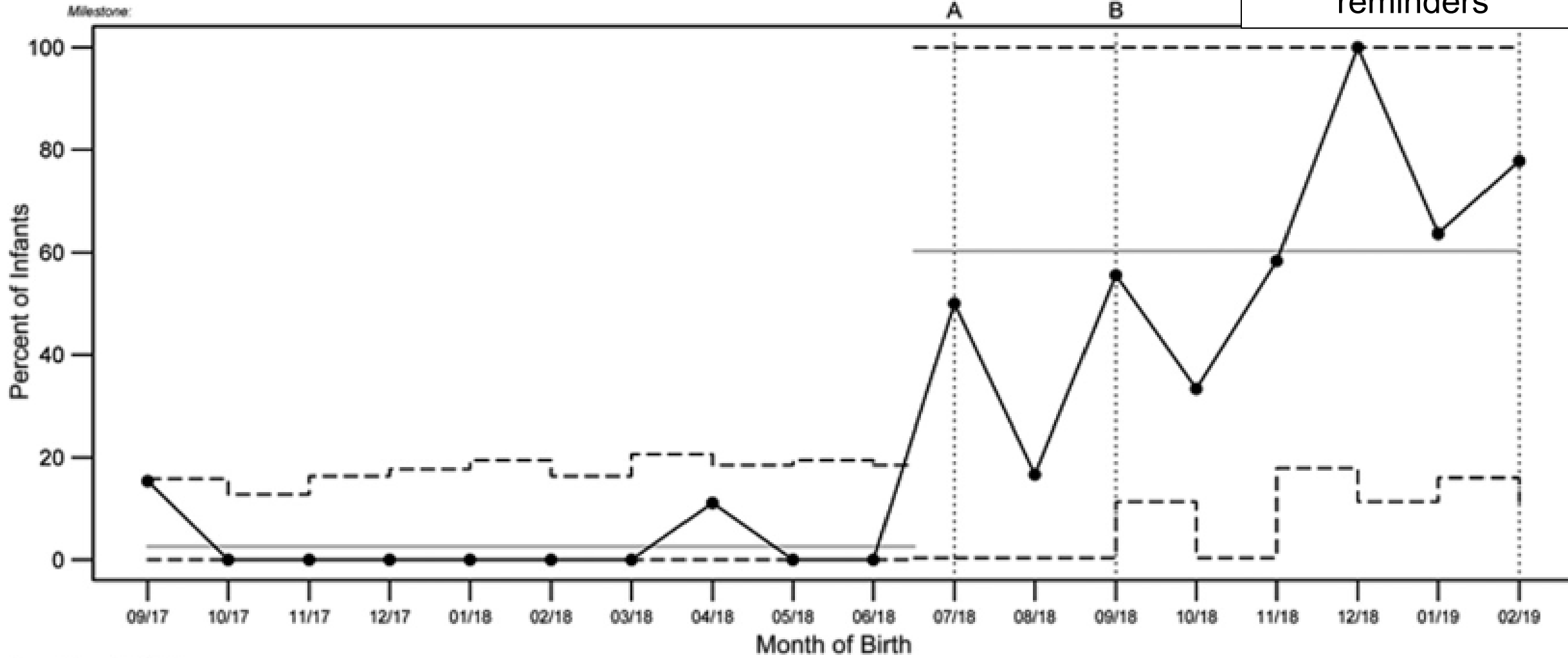


Percent (completed/total):

15% (2/13) 0% (0/22) 0% (0/12) 0% (0/10) 0% (0/8) 0% (0/12) 0% (0/7) 11% (1/9) 0% (0/8) 0% (0/9) 50% (3/6) 17% (1/6) 56% (5/9) 33% (2/6) 58% (7/12) 100% (9/9) 64% (7/11) 78% (7/9)

**B****Percent completion of discharge bundle**

Resident bi-weekly reminders



Percent (completed/total):

15% (2/13) 0% (0/22) 0% (0/12) 0% (0/10) 0% (0/8) 0% (0/12) 0% (0/7) 11% (1/9) 0% (0/8) 0% (0/9) 50% (3/6) 17% (1/6) 56% (5/9) 33% (2/6) 58% (7/12) 100% (9/9) 64% (7/11) 78% (7/9)

# Improving Care Processes

- Can be exceptionally effective
- Key resources
  - Vermont Oxford Network (captures ~80% of all VLBW births in US)
  - State perinatal collaboratives
    - Funded by CDC Division of Reproductive Health
    - Coordinated by NICHQ
    - Often co-funded by a state partner (e.g., Medicaid)
  - Guidelines (e.g., AAP)

# Improving Care Processes

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CLINICAL REPORT Guidance for the Clinician in Rendering Pediatric Care

American Academy  
of Pediatrics



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## Neonatal Opioid Withdrawal Syndrome

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# Improving Care Processes

- Can be excep
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**TABLE 4** Discharge Checklist for Infants With Opioid Exposure

Completed (Check Yes)

Task

- No significant clinical signs of withdrawal for 24–48 h
- Parent education about NOWS and routine newborn care, emphasizing safe sleep
- Pediatrician or primary care provider follow-up visit scheduled within 48 h of discharge
- Early intervention services referral
- Home-nurse visitation referral
- Hepatitis C testing follow-up, including referral to pediatric infectious disease when appropriate
- Plan of safe care, coordinating with child welfare as appropriate
- Developmental-behavioral pediatrician referral as appropriate

## Syndrome

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