



Neonatal NAS Initiative Webinar

**Your line has been placed on mute.
The webinar will begin shortly.**

**January 9, 2019
2:00-3:00pm**



General Housekeeping



- Your line has been placed on mute to reduce background noise.
 - You can press *6 to unmute yourself.
- All collaborative members want to learn from your wins and challenges so please share!





Key Driver Diagram for VONNAS initiative

SMART Aim

We aim to decrease length of stay among newborns diagnosed with NAS in participating GaPQC hospitals from 16.3 to 14.7 by 9/30/21

Global Aim

Improve care for babies and mothers impacted by NAS

Please watch the following VON Micro-lessons this month (January 2020): Lesson #12

Primary drivers

- Improve identification of mothers and infants at risk
- Increase reliability of scoring for symptoms of NAS
- Increase non-pharmacologic treatment
- Avoid separation of mother and infant
- Reduce pharmacologic treatment
- Reduce variation in treatment of infants with NAS
- Improve transition to home, engaging parents

Interventions

- Develop standard screening guidelines
- Educate staff on scoring
- Assess inter-rater reliability of scoring
- Use Eat, Sleep, Console
- Increase breastfeeding
- Use non-pharmacologic bundles of care
- Use a standard opioid treatment protocol
- Back-transfer infants stabilized on treatment
- Collaborate with support organizations/agencies

VON Vermont Oxford Network Micro-lessons

- Lesson 1. Improved Family-Centered Care at Lower Cost & Improvement Story: Using Standardization to Create a High Reliability
- Lesson 2. The Prescription Opioid Epidemic and Neonatal Abstinence Syndrome – A Public Health Approach
- Lesson 3. Virtual Video Visit Chapter 1: Linking Attitudes with Outcomes
- Lesson 4. Substance Use 101: Mythbusters
- Lesson 5. Virtual Video Visit Chapter 2: The Face of Trauma
- Lesson 6. Substance Use 101: Frequency and Neonatal Impact by Agent
- Lesson 7. Standardizing Care to Improve Outcomes
- Lesson 8. Screening and Obtaining a Complete Drug History for Substance Use in Pregnancy
- Lesson 9. Presentation and Typical Course
- Lesson 10. Non-Pharmacologic Strategies for Symptom Management
- Lesson 11. Virtual Video Visit Chapter 3: The Birth Story
- Lesson 12. Scoring Redux: Pitfalls and Perils
- Lesson 13. Scoring: Cases, Controversies
- Lesson 14. Withdrawal, Toxidromes, and Confounders
- Lesson 15. Lactation and the Substance-Exposed Mother-Infant Dyad
- Lesson 16. Engaging Families in Feeding and Nutritional Support
- Lesson 17. Developmental Outcomes of Substance-Exposed Infant
- Lesson 18. Virtual Video: Two Stories of Recovery and the Long Road Home

Hugs, not Drugs; Implementation of Eat, Sleep, Console at Maine Medical Center and Across Northern New England

Alan Picarillo, MD, FAAP

The Barbara Bush Children's Hospital

Maine Medical Center

Assistant Professor in Pediatrics

Tufts University School of Medicine

Disclosures

- I have no relevant financial disclosures
- I will be discussing off-label use of Morphine and other medications for treatment of NAS

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Life in Maine

147 inches of snow in Caribou, Maine, and counting

By **Sabrina Schnur** Globe Correspondent, February 27, 2019, 2:47 p.m.



"Several office windows at NWS Caribou are covered in deep snow and drifts," the National Weather service wrote. "This is a common view looking out windows in Northern Maine." (NWS CARIBOU)

Bostonians missing a lot of snow may need to plan a vacation to Caribou, Maine, where 147 inches have fallen so far this season, according to the National Weather Service.

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Life in Maine



Increase in NAS 2000-2009

Figure 1. Weighted National Estimates of the Rates of NAS per 1000 Hospital Births per Year

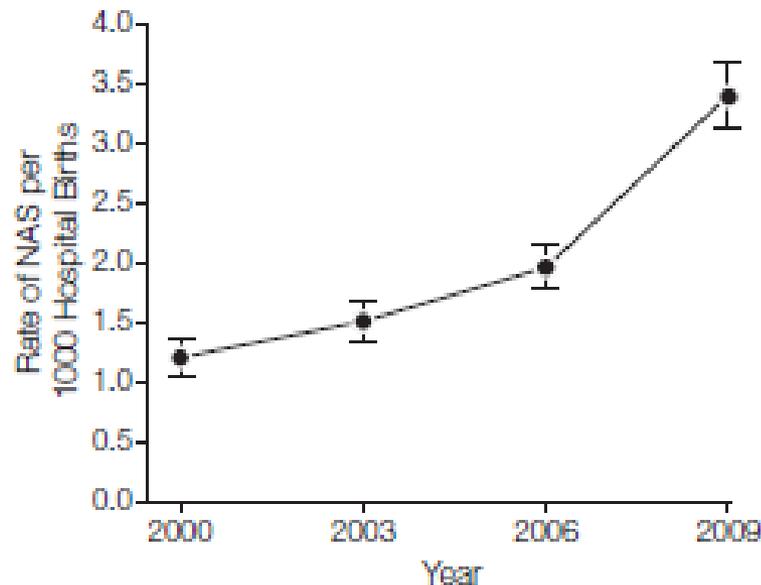
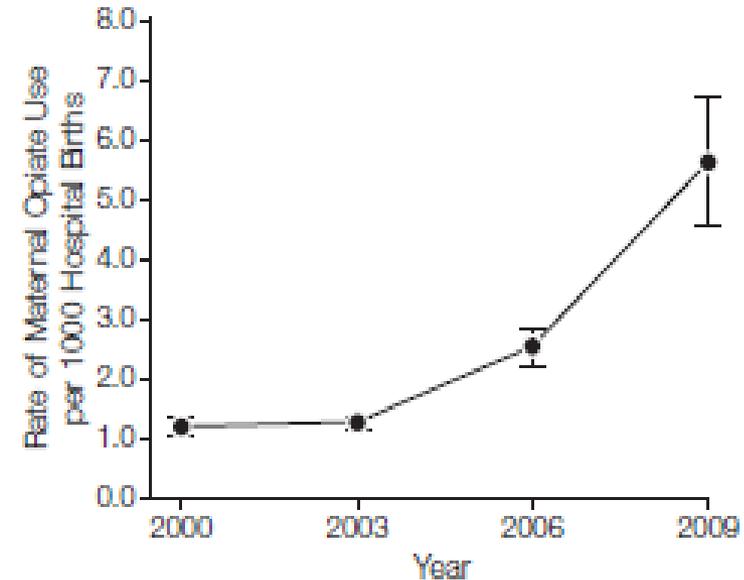


Figure 2. Weighted National Estimates of the Rates of Maternal Opiate Use per 1000 Hospital Births per Year



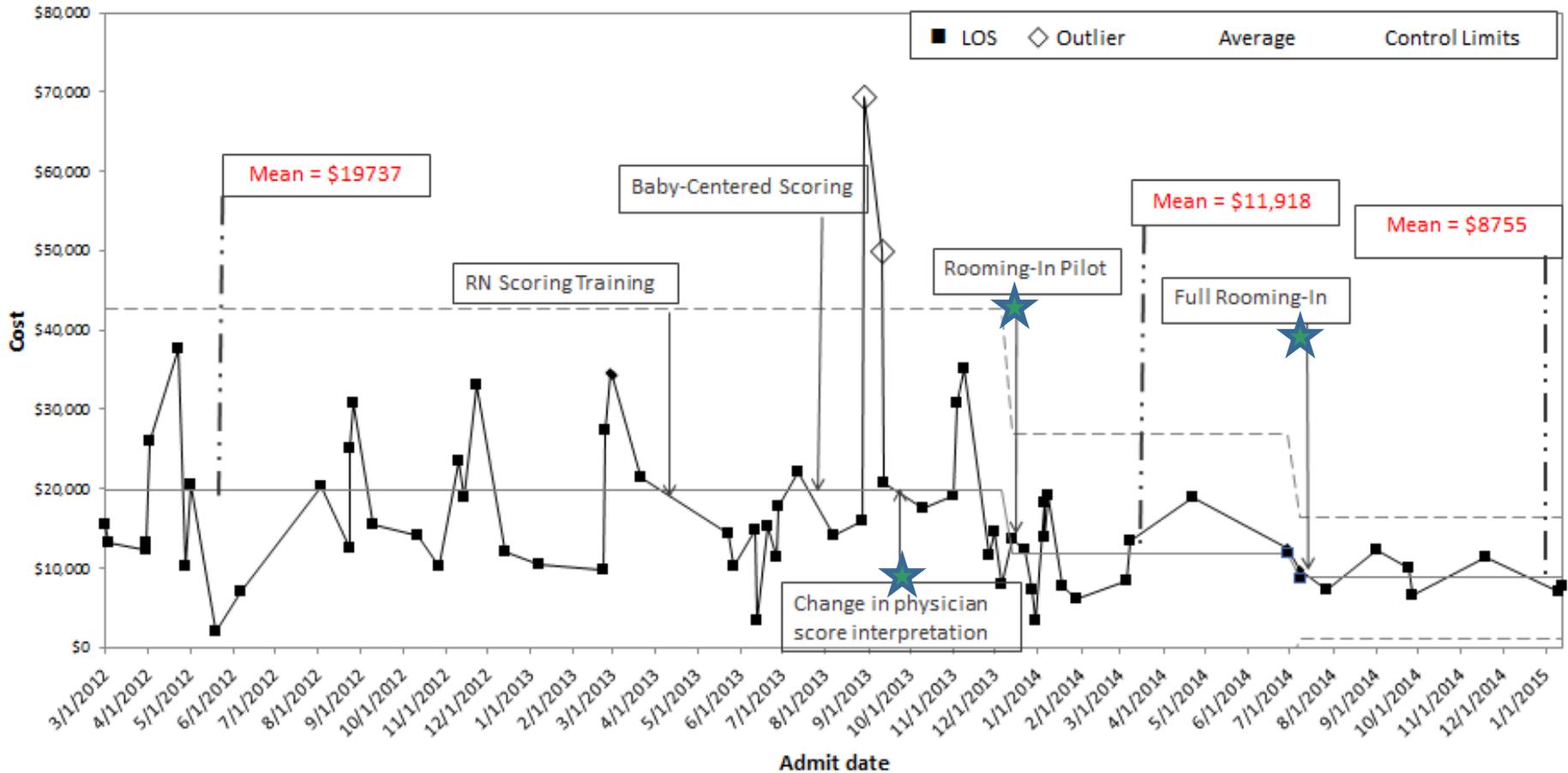
JAMA, May 9, 2012—Vol 307, No. 18

Utility of non-pharmacologic care

- 207 infants admitted to a pediatric unit instead of a NICU
 - Constant rooming-in
 - Standardized protocols for scoring, medications and weaning
- Decreased pharmacologic intervention
 - 47% to 26%
- Decreased LOS for pharmacologically treated infants
 - 16.9 to 12.3 days
- No adverse effects, no change in 30 day readmission rate
- Decreased cost for pharmacologically treated infants
 - \$20k to \$9k

[Pediatrics](#). 2016 Jun;137(6). pii: e20152929. doi: 10.1542/peds.2015-2929

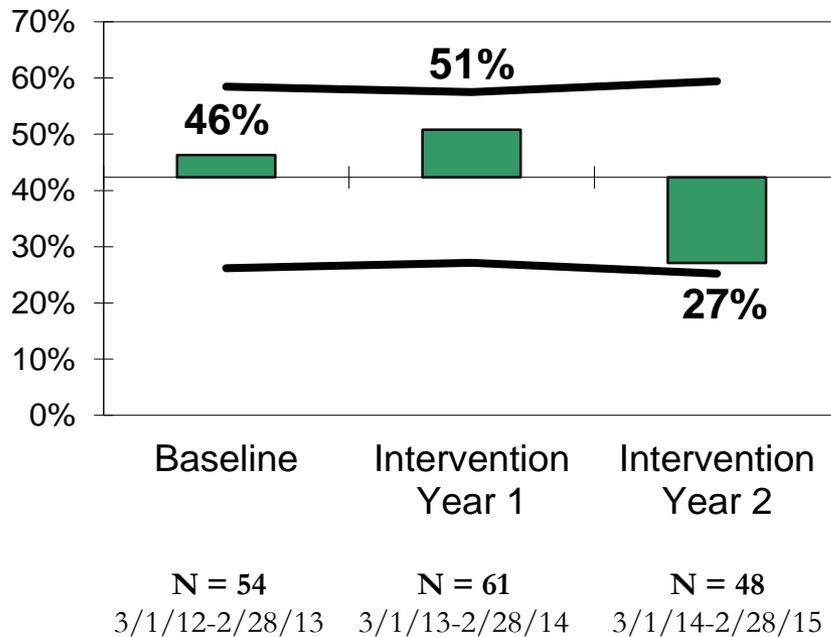
Hospital Costs per Treated Newborn



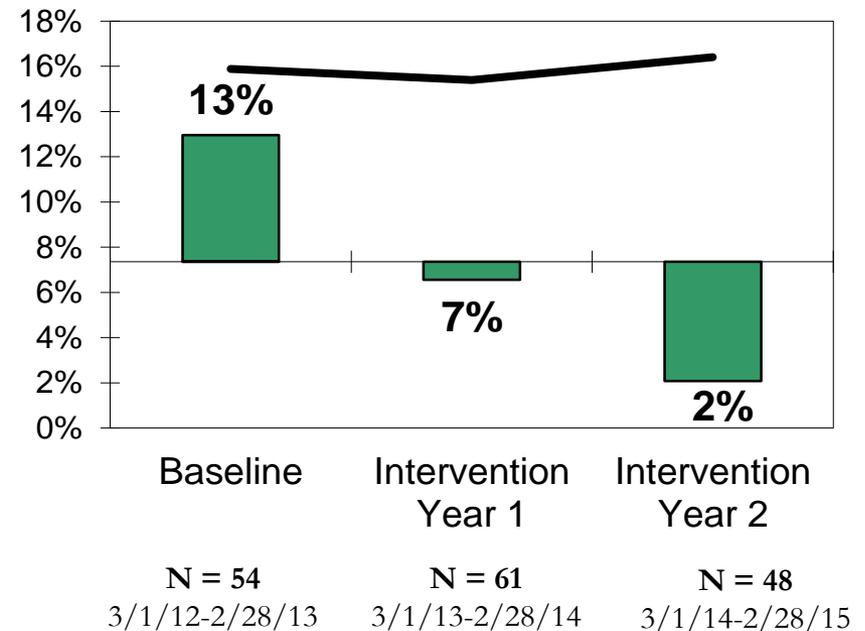
[Pediatrics](#). 2016 Jun;137(6). pii: e20152929. doi: 10.1542/peds.2015-2929

Dartmouth Results

% Opioid-exposed Newborns Receiving Morphine



% Opioid-exposed Newborns Receiving Adjunctive Agents



N = opioid-exposed infants per year

[Pediatrics](#). 2016 Jun;137(6). pii: e20152929. doi: 10.1542/peds.2015-2929

An Initiative to Improve the Quality of Care of Infants With Neonatal Abstinence Syndrome

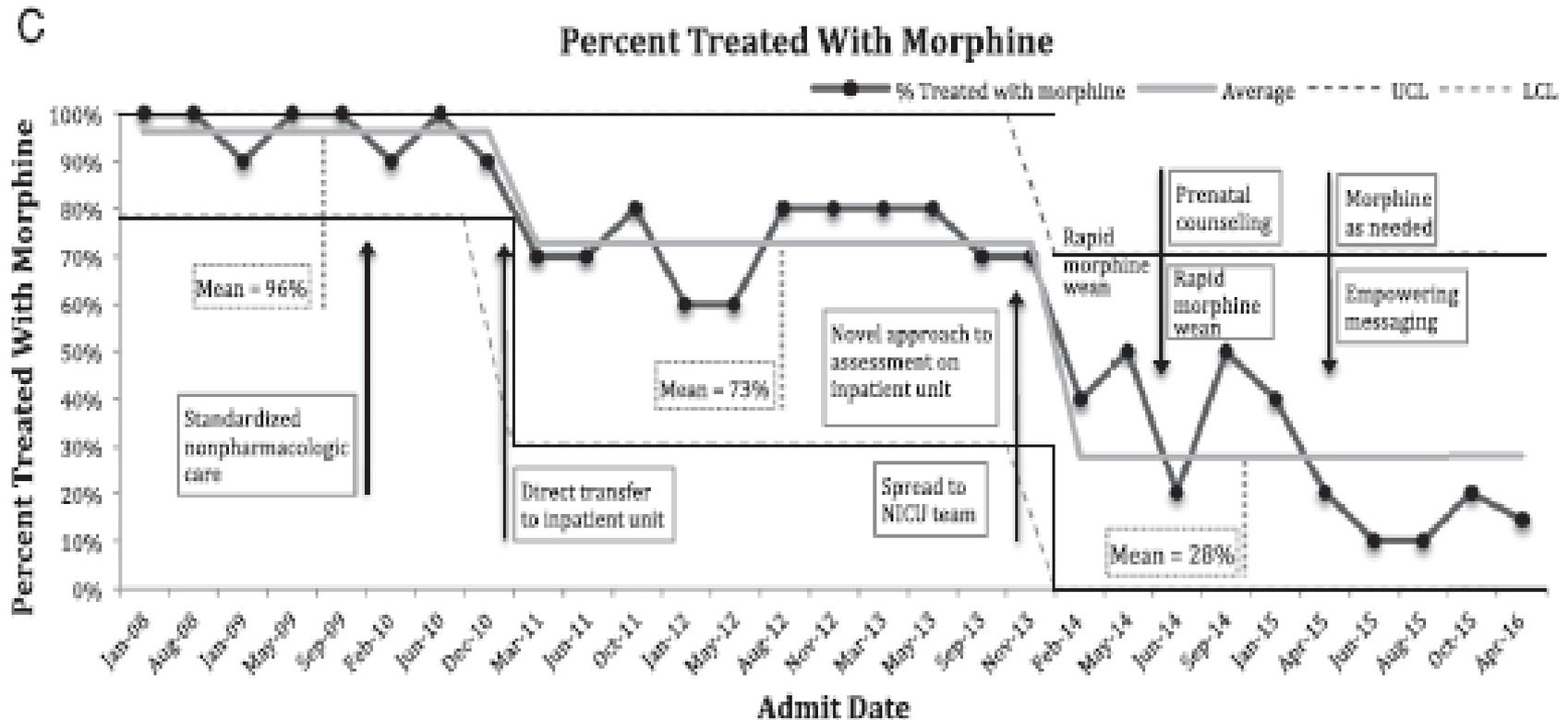
Matthew R. Grossman, MD,^a Adam K. Berkwitt, MD,^a Rachel R. Osborn, MD,^a Yaqing Xu, MS,^b Denise A. Esserman, PhD,^b Eugene D. Shapiro, MD,^{a,c} Matthew J. Bizzarro, MD^a

- Standardized non-pharmacological interventions
 - Infants placed in low stimulation environment
 - Staff engaged parents continuously in care of their infants
 - Staff trained to view non-pharmacologic indications as equivalent to medication
 - Encourage breastmilk feeding when there were no contraindications
- Prenatal counseling
- Empowerment of families
- Simplified assessment: Eat Sleep Console

Pediatrics Jun 2017, 139 (6) e20163360; DOI: 10.1542/peds.2016-3360

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Pediatrics Jun 2017, 139 (6) e20163360; DOI: 10.1542/peds.2016-3360

A Novel Approach to Assessing Infants With Neonatal Abstinence Syndrome

Matthew R. Grossman, MD,^a Matthew J. Lipshaw, MD,^a Rachel R. Osborn, MD,^b Adam K. Berkwitt, MD^a

- 50 infants were scored with Finnegan, but managed with ESC
- 6/50 infants (12%) treated with Morphine vs. 31/50 (62%) predicted to be treated with Morphine with Finnegan approach
- ESC approach started/increased Morphine on 8 days, compared with 76 days predicted by Finnegan approach

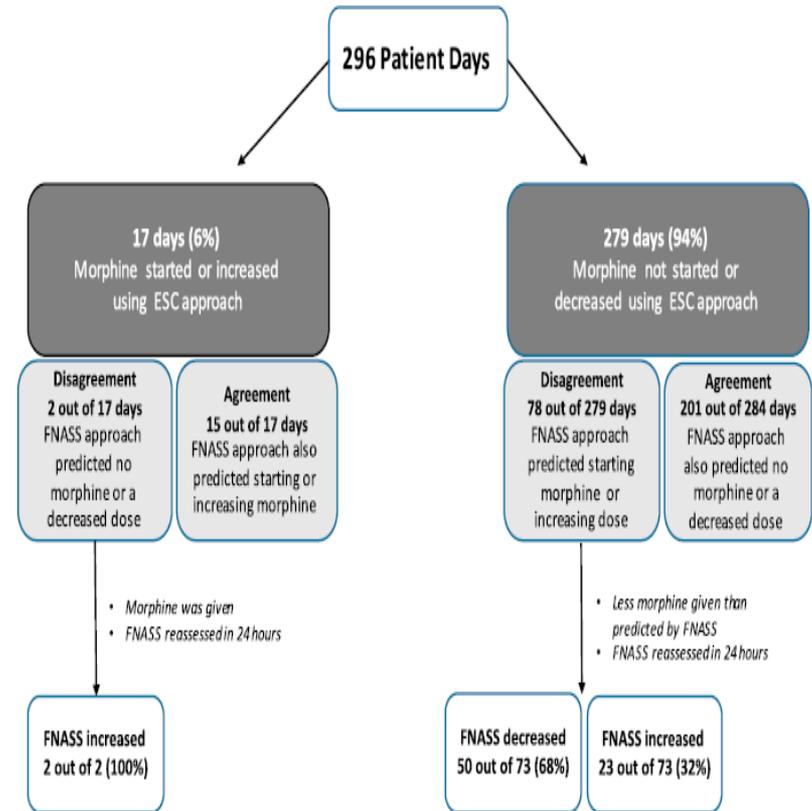


FIGURE 3 Disagreements between the ESC and FNASS approaches.

Eat Sleep Console

- Care focused around non-pharm interventions
- Enhanced partnership with families
- Maybe not pharmacologically treat “mild” withdrawal cases
- Less laborious documentation for nursing staff
- Easy to understand for families

ESC Care Tool vs. Finnegan



Appendix A

EATING, SLEEPING, CONSOLING (ESC) CARE TOOL

- Assess infant **after feedings**, preferably while **skin-to-skin** or **held swaddled** by mother/caregiver.
- Review baby's ESC behaviors since **last assessment 3-4 hours** ago using **Newborn Care Diary** with parents.
- If infant with "Yes" for any ESC item or receiving "3s" for "Soothing Support Used to Console Infant", perform **team huddle** with mother/parent & RN to determine **non-pharm interventions that can be optimized** further.
- If infant **continues** with "Yes" for any ESC item or "3s" for "Soothing Support" despite **optimal non-pharm care** and symptoms felt likely due to NAS, perform **full team huddle** with mother/parent, RN, and Infant Provider to determine if medication treatment is needed.

See back of sheet for definition of items.

TIME			
EATING			
Poor eating due to NAS? Yes / No			
SLEEPING			
Sleep < 1 hr due to NAS? Yes / No			
CONSOLING			
Unable to console within 10 min due to NAS? Yes / No			
Soothing support used to console infant:			
Soothes with little support: 1			
Soothes with some support: 2			
Soothes with much support or does not soothe in 10 min: 3			
PARENTAL / CAREGIVER PRESENCE			
Parental / caregiver presence since last assessment:			
No parent present: 0			
1 - 59 minutes: 1			
1 hr - 1 hr 59 min: 2			
2 hr - 2 hr 59 min: 3			
3 hr+: 4			
MANAGEMENT DECISION			
Recommend a Team Huddle? Yes / No			
Management decision:			
Optimize non-pharm care: 1			
Initiate medication treatment: 2			
Other (please describe):			
NON-PHARM INTERVENTIONS			
Rooming-in: Increased / Reinforced			
Parental presence: Increased / Reinforced			
Skin-to-skin contact: Increased / Reinforced			
Holding by caregiver/cuddler: Increased / Reinforced			
Swaddling: Increased / Reinforced			
Optimal feeding: Increased / Reinforced			
Non-nutritive sucking: Increased / Reinforced			
Quiet environment: Increased / Reinforced			
Limit visitors: Increased / Reinforced			
Clustering care: Increased / Reinforced			

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SYSTEMS	SIGNS AND SYMPTOMS	SCORE	AM						PM						DAILY WT.		
			2	4	6	8	10	12	2	4	6	8	10	12			
CENTRAL NERVOUS SYSTEM DISTURBANCES	High Pitched Cry	2															
	Continuous High Pitched Cry	3															
	Sleeps < 1 Hour After Feeding	3															
	Sleeps < 2 Hours After Feeding	2															
	Hyperactive Moro Reflex	2															
	Markedly Hyperactive Moro Reflex	3															
	Mild Tremors Disturbed	2															
	Moderate Severe Tremors Disturbed	3															
	Mild Tremors Undisturbed	1															
	Moderate Severe Tremors Undisturbed	2															
METABOLIC VASOMOTOR/ RESPIRATORY DISTURBANCES	Increased Muscle Tone	2															
	Excoriation (specify area): _____	1															
	Myoclonic Jerks	3															
	Generalized Convulsions	3															
	Sweating	1															
	Fever < 101 ^o F (39.3 ^o C)	1															
	Fever > 101 ^o F (39.3 ^o C)	2															
	Frequent Yawning (> 3-4 times/interval)	1															
	Mottling	1															
	Nasal Stuffiness	1															
GASTROINTESTINAL DISTURBANCES	Sneezing (> 3-4 times/interval)	1															
	Nasal Flaring	2															
	Respiratory Rate > 60/min	1															
	Respiration Rate > 60/min with Retractions	2															
	Excessive Sucking	1															
	Poor Feeding	2															
	Regurgitation	2															
	Projectile Vomiting	3															
	Loose Stools	2															
	Watery Stools	3															
SUMMARY	TOTAL SCORE																
	SCORER'S INITIALS																
	STATUS OF THERAPY																

Adapted from Finnegan L. Neonatal abstinence syndrome: assessment and pharmacotherapy. Neonatal Therapy: An update, F.F. Rubaltelli and B. Grant, editors. Elsevier Science Publishers B.V. (Biomedical Division), 1986: 122-146

Eat, Sleep, Console



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Finnegan vs. ESC

- 21 items (20 subjective, 1 objective)
 - Never been validated
 - Inter-rater reliability issues?
 - High rates of pharmacologic treatment reported with standard scoring criteria
 - Long term outcomes with prolonged medication exposure?
- 3 items (all subjective)
 - Never been validated
 - Inter-rater reliability issues?
 - Rooming-in is a key to the model
 - Will non-pharm interventions alone have deleterious effects on neurological development?

AAP statement (2012)

- Since the introduction of the abstinence scales in 1975, published reports have documented that the decision to initiate pharmacologic treatment has been based on single or serial withdrawal scores.
- However, **no studies to date have compared the use of different withdrawal score thresholds for initiating pharmacologic intervention on short-term outcomes** (eg, severity and duration of withdrawal signs, weight gain, duration of hospitalization, need for pharmacologic treatment, or cumulative drug exposure).
- Is the threshold for starting medication artificial?
 - Three “8’s”, two “12’s”?
 - Different thresholds by nursery
 - Infant **required** pharmacological treatment vs. **provider decided to start** pharmacological treatment*

AAP Clinical Report: Neonatal Drug Withdrawal. Hudak and Tan. Committee on Drugs and the Committee on the Fetus and Newborn. *Pediatrics* 129:e540-560, 2012.

Is Morphine safe for neonates?

- Attarian et al (2014) Brain Sciences
 - A growing body of basic and animal evidence suggests potential long-term harm associated with neonatal opioid therapy. Morphine increases **apoptosis** in human microglial cells, and animal studies demonstrate long-term changes in behavior, brain function, and spatial recognition memory following morphine exposure.
- Steinhorn, et al (2015): J. Pediatr. Victorian Infant Brain Cohort
 - At 2 years, morphine-exposed children were **more likely to show behavioral dysregulation** (P=.007) than no-morphine children, but at 7 years no detrimental impacts of morphine on neurobehavioral outcome were observed.
- Towers et al (2019) Pediatrics
 - Data from Tennessee comparing >400 NAS infant and controls
 - NAS infants had **statistically smaller head circumferences** than controls
 - 30% of NAS infants had head circumferences <10th percentile vs. 8% of non-NAS infants

Is Methadone safe(r)?

- Monnelly et al (2018) Neuroimage Clin
 - 20 methadone-exposed neonates born after 37 weeks' postmenstrual age (PMA) and 20 non-exposed controls underwent diffusion MRI. Prenatal methadone exposure is associated with **microstructural alteration in major white matter tracts**, which is present at birth and is independent of head growth.
- Burke et al Glob Pediatric Health (2017)
 - Retrospective review of infants treated with Morphine vs. Methadone for NAS (36 infants)
 - Infants then followed with Bayley-III exams
 - Morphine treated infants had **significantly higher scores in Cognitive Composite and Total Motor Composite scores** compared to Methadone treated infants

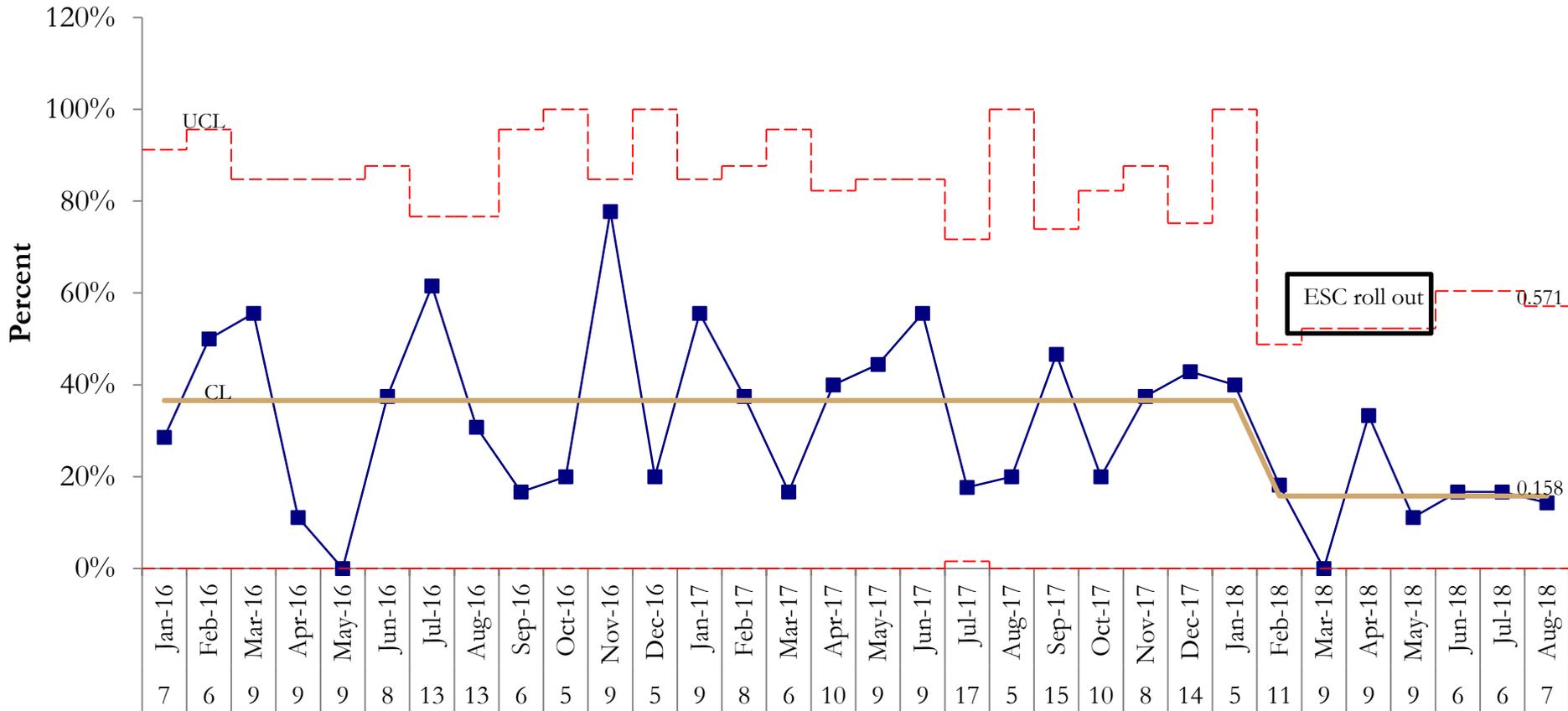
What about untreated withdrawal?



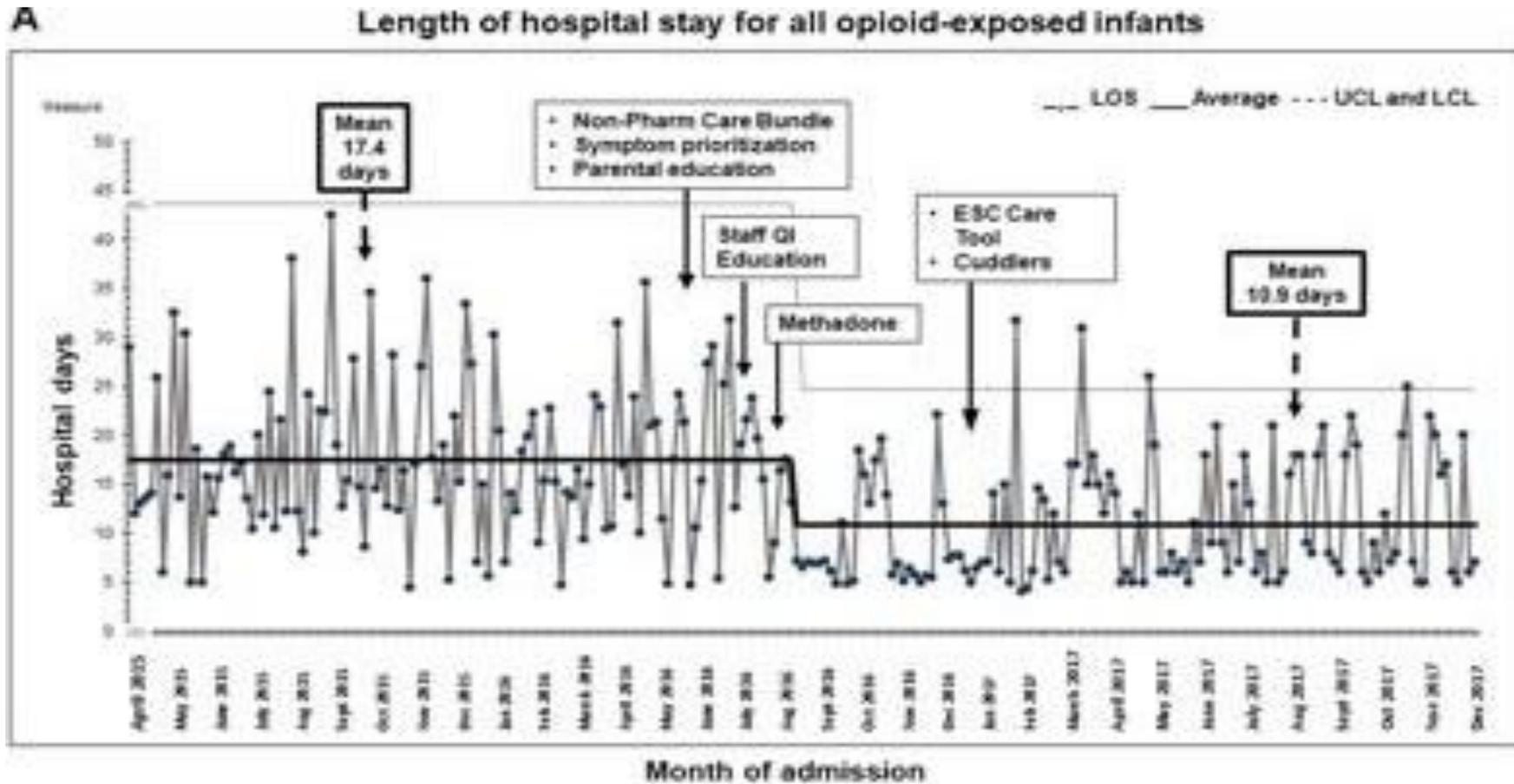
<http://clipart-library.com/question-mark.html>

Is it just rooming in?

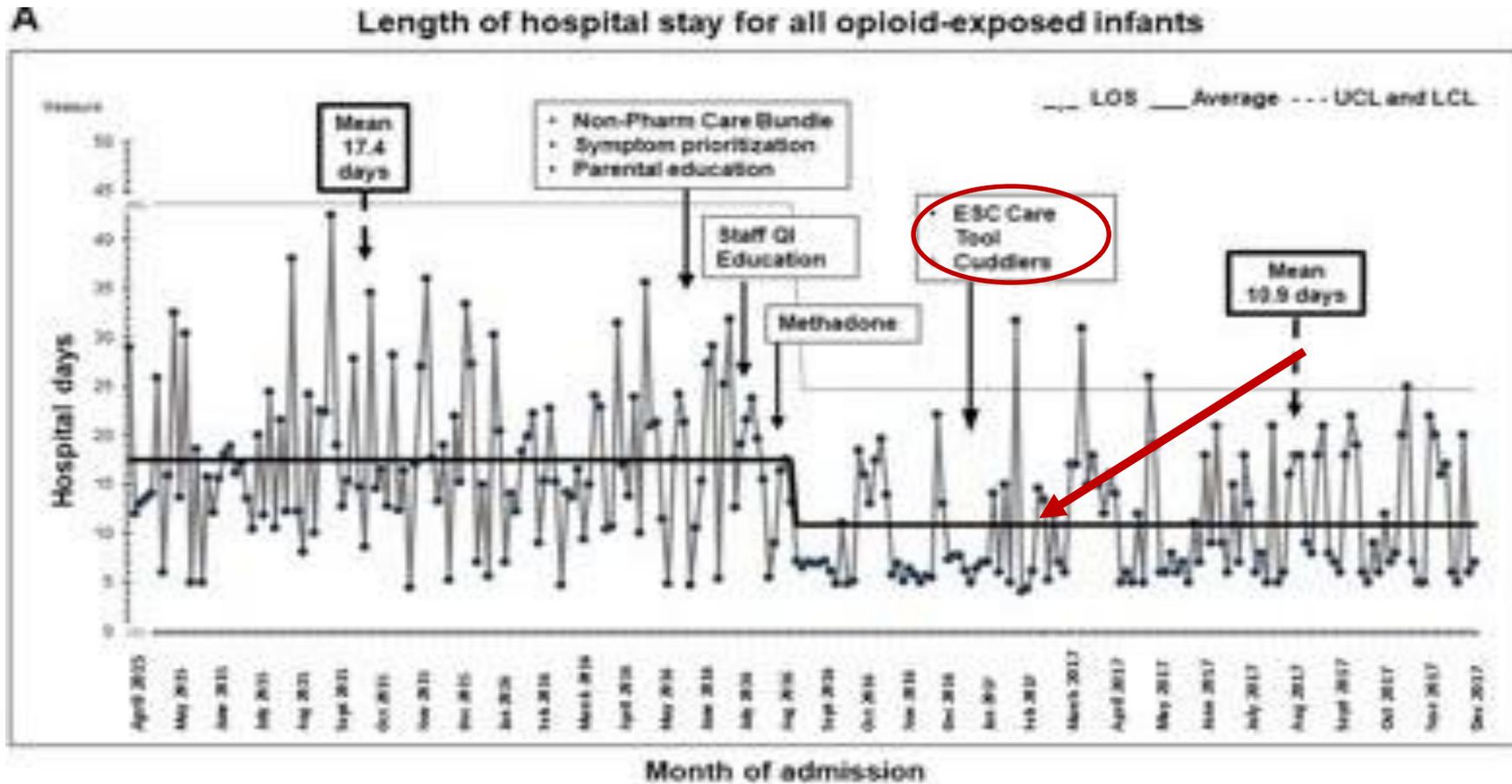
(p Chart) Pharm treated SEN ≥ 35 weeks



ESC may not work everywhere...



ESC may not work everywhere...

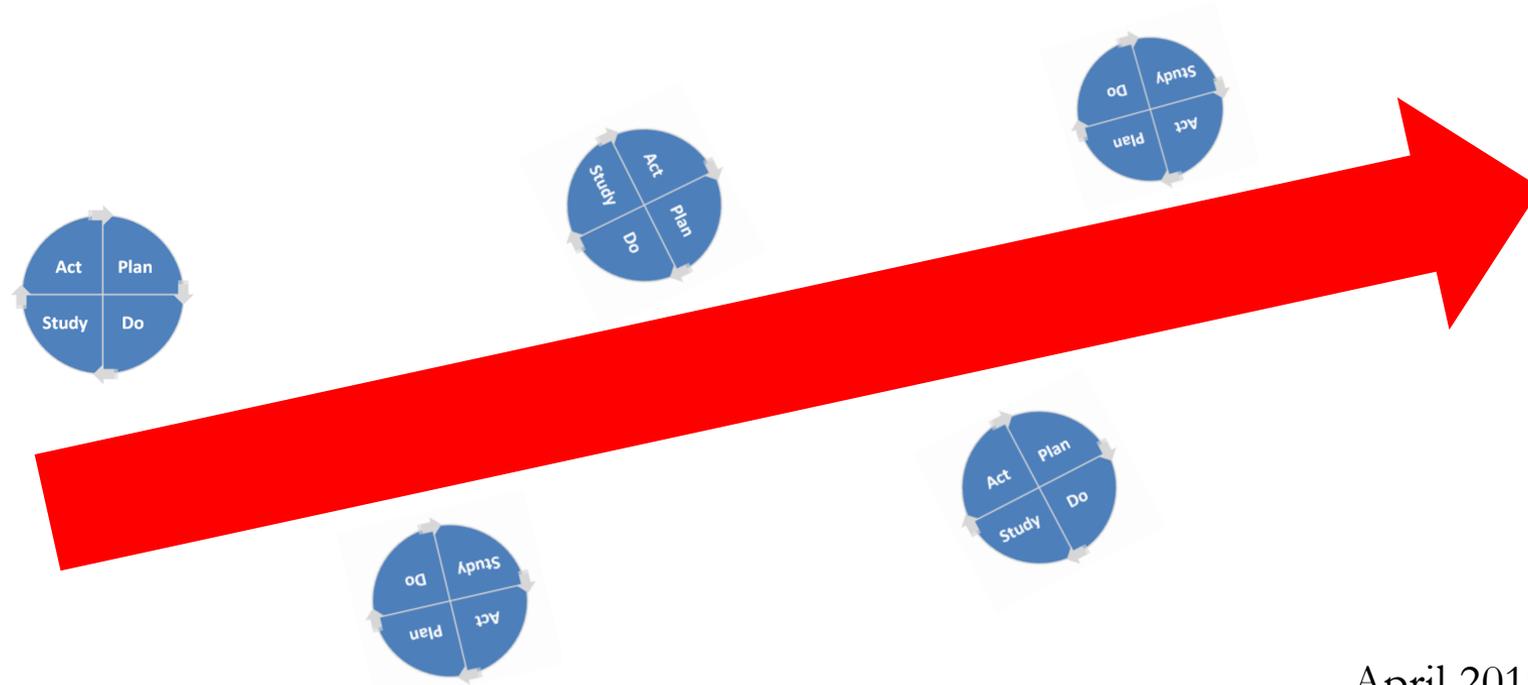


MMC Clinical Transformational Project

- Clinical initiative launched in September 2018 to improve the care of infants and families affected by NAS
- Multidisciplinary project
 - Prenatal workgroup
 - ESC workgroup
 - Pharmacology workgroup
- Aim of project was to decrease the percent of pharmacologically treated SEN by 20% with implementation of the Eat, Sleep, Console Care Tool
- Multiple PDSA cycles, most centering on education of staff.



Methods



September 2017

April 2018 Launch

PDSA #1: Taskforce established, baseline data collected

PDSA #2: Simulation-based ESC team training (Gold Star raters)

PDSA #3: Development of patient materials and EMR documentation

PDSA #4: Staff training

PDSA #5: Development of prn medication guidelines

Data collection

REDCAP STUDY IDENTIFIERS (will be entered into REDCap)	
1. REDCap Study ID	This will be generated for you by REDCap; it will be unique to every infant in the initiative. You do not need to record this on your data form.
2. Your Hospital	_____
3. Your Hospital Study ID	_____
<input type="checkbox"/> Please assign each baby a unique ID to your hospital. <input type="checkbox"/> Start with 001 or continue from 015 or 2016 last number and go forward sequentially.	
DEMOGRAPHIC INFORMATION	
1. Birth month (1-12) and year	Month: _____ Year: _____
2. Birth weight	Birth weight: _____ grams
2a. Weight day of life Enter weight on calendar day of life Calendar date of birth is 01, regardless of time of birth; 02 is the next calendar day	Weight: _____ grams
3. Gestational age in weeks and days	Weeks: _____ Days: _____
4. Sex	<input type="radio"/> Male <input type="radio"/> Ambiguous <input type="radio"/> Female <input type="radio"/> Unknown
BASIC HOSPITALIZATION INFORMATION	
5. Location of birth	<input type="radio"/> Inborn <input type="radio"/> Outborn
5a. If outborn, what day of life was admission to your hospital? Day of birth is considered day of life 01.	Day of life of admission if outborn: _____
If outborn, complete all following fields based on information available from your hospital as well as birth hospital. If information from birth hospital/transferring hospital is not available, indicate "unknown" or leave questions blank.	
6. Was an antenatal consult done prior to birth, anytime during pregnancy, with pediatrics or neonatology?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown
7. In what locations did the infant receive care during hospitalization?	<input type="checkbox"/> Level 1 Nursery (newborn, mother-baby nursery) <input type="checkbox"/> Level 2 Nursery (special care, intermediate care) <input type="checkbox"/> Level 3 Nursery (intensive care unit) <input type="checkbox"/> Pediatrics <input type="checkbox"/> Other (Specify: _____)

MATERNAL-FETAL EXPOSURES	
8. What were the maternal-fetal opiate exposures?	<input type="checkbox"/> Check all that apply. <input type="checkbox"/> Information came from maternal self-report, maternal record, maternal toxicology screening, or neonatal toxicology screening. <input type="checkbox"/> Do not include if exposure was clearly only in the first trimester. <input type="checkbox"/> Buprenorphine includes Subutex and Suboxone. <input type="checkbox"/> Other opioids include all agents that were not methadone, buprenorphine, or heroin; this includes fentanyl, codeine, oxycodone, hydrocodone, morphine, and hydromorphone (short and long-acting).
8a. Enter the name of mother's addiction treatment program or provider, if known.	<input type="checkbox"/> Methadone, prescribed <input type="checkbox"/> Methadone, illicit <input type="checkbox"/> Methadone, unknown <input type="checkbox"/> Buprenorphine, prescribed <input type="checkbox"/> Buprenorphine, illicit <input type="checkbox"/> Buprenorphine, unknown <input type="checkbox"/> Heroin <input type="checkbox"/> Other opioids, prescribed <input type="checkbox"/> Other opioids, illicit <input type="checkbox"/> Other opioids, unknown source <input type="checkbox"/> No opioid exposure able to be determined _____
8b. Indicate the mother's addiction treatment medication admission for delivery.	<input type="radio"/> Methadone <input type="radio"/> Buprenorphine <input type="radio"/> No prescribed addiction treatment
8c. Daily dose of maternal opioid addiction treatment admission for delivery (mg)	_____ <input type="checkbox"/> Enter 99 if unable to determine
9. What were other maternal-fetal exposures of note?	<input type="checkbox"/> Check all that apply. <input type="checkbox"/> Do not include if exposure was clearly only in the first trimester. <input type="checkbox"/> Cocaine <input type="checkbox"/> Marijuana <input type="checkbox"/> Alcohol <input type="checkbox"/> SSRI <input type="checkbox"/> Nicotine <input type="checkbox"/> Amphetamine or Methamphetamine, prescribed <input type="checkbox"/> Amphetamine or Methamphetamine, illicit <input type="checkbox"/> Benzodiazepine, prescribed <input type="checkbox"/> Benzodiazepine, illicit <input type="checkbox"/> Other (Specify: _____)

Data collection

2016-17 NNPEQIN Neonatal Abstinence Syndrome Improvement Initiative Data Form

Day of birth is considered day of life ONE for purpose of this data form. This means calculating day of life would be days between dates. i.e. Day of life Date for calculation - Date of birth = Day of life

HUMAN MILK USE	
10. Was this infant eligible to receive his/her mother's own milk per your hospital's guidelines?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown <input type="checkbox"/> No hospital guideline on breast milk
11. Did infant receive any of his/her mother's own milk at any time during hospitalization?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown
12. What type of feeding was infant receiving at discharge/transfer from your hospital? <input type="checkbox"/> Mark all types of feeding given in the 24 hours prior to discharge.	<input type="checkbox"/> Mother's breast milk <input type="checkbox"/> Donor breast milk <input type="checkbox"/> Formula <input type="checkbox"/> Unknown
NAS PHARMACOLOGIC TREATMENT	
13. Did infant receive pharmacologic agents for NAS?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown
If yes, answer questions 13a-13f. If no, or unknown, go to question 14.	
13a. What was the first pharmacologic agent used for treatment of NAS? <input type="checkbox"/> If two agents were started simultaneously, enter primary agent here and second agent in 13d, and enter same starting day for both. Primary agent would be that agent used most commonly to treat NAS in your hospital.	<input type="radio"/> Morphine <input type="radio"/> Methadone <input type="radio"/> Clonidine <input type="radio"/> Phenobarbital <input type="radio"/> Other (Specify: _____) <input type="radio"/> Unable to determine
13b. What day of life was first pharmacologic agent initiated? <input type="checkbox"/> Day of birth is considered day of life ONE.	_____
13c. Was a 2nd pharmacologic agent used for treatment of NAS?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown <input type="radio"/> Morphine <input type="radio"/> Methadone <input type="radio"/> Clonidine <input type="radio"/> Phenobarbital <input type="radio"/> Other (Specify: _____) <input type="radio"/> Unable to determine
13d. What was the second pharmacologic agent used for treatment of NAS?	_____
13e. What day of life was second pharmacologic agent initiated? <input type="checkbox"/> Enter -99" if not applicable. <input type="checkbox"/> Day of birth is considered day of life ONE.	_____
13f. What was the maximum dose (in mg/kg/dose) of the opiate? The opiate could be morphine or methadone used as either the 1 st or 2 nd drug. <input type="checkbox"/> If unable to determine, enter -99"	_____

2016-17 NNPEQIN Neonatal Abstinence Syndrome Improvement Initiative Data Form

Day of birth is considered day of life ONE for purpose of this data form. This means calculating day of life would be days between dates. i.e. Day of life Date for calculation - Date of birth = Day of life

NON-PHARMACOLOGIC CARE	
(14. This item omitted from NNPEQIN data form.)	
15a. Did baby and mother (or other parent) room-in together during the baby's hospitalization? <input type="checkbox"/> Check all that apply	<input type="checkbox"/> Yes, prior to mother's discharge <input type="checkbox"/> Yes, after mother's discharge <input type="checkbox"/> No <input type="checkbox"/> Unknown
<input type="checkbox"/> Check "Yes, prior to mother's discharge" if mother/baby care was provided in the same room at any time prior to mother's discharge. <input type="checkbox"/> Check "Yes, after mother's discharge" if mother or other family provider slept overnight in the same room where baby's care delivered after mother's discharge. <input type="checkbox"/> Check "No" if either mother or other family provider roomed-in at any time during the baby's hospitalization.	
DISCHARGE AND FOLLOW-UP INFORMATION	
If infant was transferred from your hospital to another hospital, answer the following questions based on information from your hospital as well as the receiving hospital. DAY OF BIRTH IS CONSIDERED DAY OF LIFE ONE.	
16. Was infant discharged to home from your hospital, or from another hospital?	<input type="radio"/> Your hospital <input type="radio"/> Another hospital
16a. What day of life was discharged from your hospital? Day of birth is considered day of life ONE.	_____
17a. If infant was transferred to another facility, what day of life was final discharged to home? <input type="checkbox"/> If unable to determine, enter -99" Day of birth is considered day of life ONE.	_____
18. What was the eventual discharge disposition from the hospital? <input type="checkbox"/> This could be from your hospital or receiving hospital.	<input type="radio"/> Home with biologic parent <input type="radio"/> Home with guardian or foster parent <input type="radio"/> Other (Specify: _____) <input type="radio"/> Unable to determine
19. At the time of discharge to home, was the infant receiving medications for NAS?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unable to determine <input type="checkbox"/> Morphine <input type="checkbox"/> Methadone <input type="checkbox"/> Clonidine <input type="checkbox"/> Phenobarbital <input type="checkbox"/> Other (Specify: _____)
19a. If yes, what medications was infant receiving at time of discharge to home? <input type="checkbox"/> Check all that apply.	_____

Simulation-based training

- Typically hospital-based teams consist of MD/DO, NNP, NICU nurse, special care nurse, nursery nurse or mother-baby nurse
- Standardized ESC cases with provider, parent and “infant”
- Interactions are filmed and reviewed with teams for debriefings

Patient materials

Maine Resources

INFORMATION ON NAS

March of Dimes

- » [www.marchofdimes.org/complications/neonatal-abstinence-syndrome-\(nas\).aspx](http://www.marchofdimes.org/complications/neonatal-abstinence-syndrome-(nas).aspx)

SUBSTANCE ABUSE RESOURCES

MaineHealth Learning Resource Center

- » (866) 609-5183

Maine Alliance for Addiction Recovery (MAAR)

Free recovery support program and recovery housing help.

- » (207) 621-8118

Office of Substance Abuse Information and Resource Center

- » 1 (800) 499-0027

Substance Abuse & Mental Health Services Administration

- » www.samhsa.gov

Maine Mother's Network

- » 1 (800) 244-6431

RESOURCES FOR NEW PARENTS

Public Health Nursing in Maine (Statewide Central Referral)

- » (877) 763-0438

Text4Baby

Free smartphone app that sends you tips and helpful information.

- » www.text4baby.org

Maine Families

Free visits from child development professionals and parent educators.

- » (207) 624-7900

- » www.mainefamilies.org

Lactmed

Free app and website providing information about taking medications or supplements while breastfeeding.

MMC Family Birth Center

- » mmc.org/familybirthcenter
- » Childbirth education
- » (207) 662-6132

Information for Expectant Parents

Neonatal Abstinence Syndrome (NAS)



The Barbara Bush
Children's Hospital
At Maine Medical Center

bbch.org



143674 3/18

Patient materials

CONGRATULATIONS ON YOUR PREGNANCY!

The information in this pamphlet will help you provide the best care for your baby. Most babies who are exposed to certain medicines or drugs in the womb will have Neonatal Abstinence Syndrome (NAS). These medicines include methadone, Subutex, OxyContin, Vicodin, and codeine. NAS can be caused by prescribed and unprescribed medicines as well as drugs like heroin.

What are the signs of NAS?

- » High-pitched cry and crankiness
- » Muscle stiffness and tightness
- » Trouble sleeping
- » Vomiting and/or diarrhea
- » Excessive weight loss
- » Sneezing
- » Shaking and jitters
- » Difficulty feeding
- » Fast breathing
- » Fever

What can I do to help before my baby is born?

- » DO attend all of your doctor's appointments.
- » DO take your vitamins and any prescribed medications.
- » DO NOT drink alcohol.
- » DO talk to your doctor if you are smoking tobacco or marijuana. If you have used marijuana recently, please tell your doctor and read the handout about marijuana use.
- » DO talk to your doctor about medication-assisted

therapy (MAT) if you take drugs that are not prescribed to you. MAT is a treatment that involves taking prescribed medication to reduce cravings and withdrawal. MAT helps your baby grow safely.

- » This will be a busy time — start thinking about which family and friends will be helping you inside and outside of the hospital.

Should I still take my prescription opioids?

- » Please do not try to wean off of your medicines on your own.
- » It is important for you to take your prescription medicines as your doctor prescribed.
- » The amount of NAS symptoms that your baby has is not related to the dose of your prescription opioids.

Can I breastfeed my baby?

- » We encourage you to breastfeed your baby.
- » We may fortify your breast milk or add formula to give your baby extra calories and help them gain weight.
- » If you are using marijuana, your breast milk may not be safe for your baby. Please do not use marijuana during your pregnancy or during breastfeeding.

What will happen after my baby's birth?

- » NAS is treatable.
- » Your baby's care team will assess your baby's withdrawal symptoms every three to four hours after feedings.
- » As part of your baby's treatment, you will be highly encouraged to stay with your baby whenever he or she is in the hospital. You will be asked to use a **Newborn Care Diary** to write down your baby's feeding and sleeping schedule.
- » Maine state law requires health care providers to notify DHHS' Office of Child and Family Services when a baby has been born with symptoms from a prenatal substance exposure. DHHS's goal is to work with your care team to make sure you have everything you need to keep your baby healthy and connect you to helpful resources.

How long will my baby need to stay in the hospital?

- » Your baby will need to stay in the hospital for at least seven days.
- » If your baby is still showing signs of withdrawal, he or she may need to stay longer.
- » Please remember: all babies are different. Withdrawal happens in different ways for different babies.

Will my baby need medicine?

We may need to give your baby medicine like morphine to help with withdrawal. Your baby's doctor will talk with you about what medicine is best for your baby.

What Can I do?

ROOM IN TOGETHER

One of the best things you can do for your baby is to keep him/her with you at all times in your own room. Being close to your baby helps you respond quickly to his/her needs. Your baby will feel safest and most comfortable when close to you.

SKIN TO SKIN (BARE CHEST TO BARE CHEST)

Spend as much time skin to skin with your baby when you are awake. This helps your baby eat and sleep better, and will help calm your baby. It can also help your milk supply when breast-feeding.

SWADDLE

Hold your baby or swaddle your baby in a light blanket. Just being close to someone, or swaddled, helps your baby feel safe and comfortable.

CALM ROOM

Keep your room calm and quiet with the lights down low. Loud noises and bright lights may upset your baby.

LIMIT VISITORS

Try to have only one or two visitors in your room at a time as more may make your baby fussy or not sleep as well.

Summary:

YOU ARE THE BEST MEDICINE FOR YOUR BABY.

Staff training

- Who to train?
 - Nursing (well infant nursery, mother-baby, special care, NICU, pediatrics, etc)
 - Providers (pediatrics, NNPs, PAs, family practitioners, residents, etc.)
 - Others?
- How long to train?
 - Hour long training sessions
- How often to train?
 - Yearly? New hires?

Prn medication

- Meetings with pharmacy to determine dosage and frequency
- Need to decide about location of doses
 - Well infant nursery vs. NICU/SCN
- Monitoring vs. no monitoring
 - CR monitor?
 - Pulse oximetry?
 - Don't forget, these infants are NOT Morphine naïve...they've been exposed to opiates during their gestation.
- Development of dosing protocol

MMC NAS Pharmacologic Management Algorithm

NAS pharmacological management algorithm

> Assess infant after feedings preferably while **skin-to-skin** or **held swaddled** by mother/caregiver
 > Review ESC behaviors, which have occurred since last assessment using **Newborn Care Diary** with parents
 > **Optimal non-pharm care: Breastfeeding** (if no medical contraindications), **rooming-in, parental presence, skin-to-skin, holding, swaddling, ad lib feeding** (at least q3), **quiet environment, limiting visitors.**
 > If **YES** to any ESC item or "3s" for "**Soothing Support Used to Console Infant**" (i.e., difficulty responding to all caregiver soothing efforts OR does not soothe within 10 minutes), perform **team huddle** with mother/parent and RN to determine **non-pharm interventions** that can be optimized
 > If continues with "Yes" for any ESC item or "3s" or "**Soothing Support**" despite **optimal non-pharm care**, perform **full team huddle** with mother/parent, RN and infant provider.

Morphine initiation: Consider initiating oral **Morphine** after a **full team huddle** if:

- Continues with "Yes" to any Esc item or "3s" for "Soothing Support" **AND**
- Non-pharm care optimized to greatest extent **AND**
- Non-NAS causes excluded (e.g., cluster feeding, SSRI, nicotine withdrawal in first 24 hours)

Starting dose of Neonatal Morphine oral solution on Mother-Baby floor:

- **0.05 mg/kg/dose PO x 1 dose** (use birthweight for dosing); no cardiorespiratory monitoring required

Additional Morphine dosing: Consider additional Morphine after **full team huddle** if:

- Continues with Yes" to any ESC item or "3s" for "Soothing support"
- Non-pharm care optimized to greatest extent **AND**
- Non-NAS causes excluded
- **CONTACT NICU TO ARRANGE TRANSFER**

NICU/CCN dosing regimen:

- Continue dosing of Morphine at 0.05 mg/kg/dose q3 prn
- If infant needs >4 doses of Morphine in 24 hour period, will place on scheduled Morphine dosing q3

To increase Morphine scheduled dose(s):

- Give bolus dose of 0.02 mg/kg once and increase baseline dose by 0.02 mg/kg/dose. Recommended **maximum** daily dose= 0.11 mg/kg/dose every 3 hours

Consider adding a second agent (e.g. phenobarbital or clonidine) if Yes responses to ESC due to NAS **AND** non-pharm care optimized **AND** morphine dose maximized **OR** unable to wean by day 7 of treatment **OR** concern for poly-substance withdrawal.

Phenobarbital: Load with 10 mg/kg/dose for 2 doses (total 20 mg/kg) administered orally every 3-4 hours with a feed. Begin maintenance therapy 24 hours after the last loading dose of 5 mg/kg/day. Monitoring by serum levels are based on clinical judgment. Wean the patient off morphine while on phenobarbital. Once off morphine for 24 hours, decrease the phenobarbital dose by 50%. Monitor patient for 24-48 hours prior to discharge. Discharge with two weeks of phenobarbital with instructions to discuss with primary care physician discontinuing one week after discharge.

See supplemental Page #2 for Clonidine dosing and weaning parameters

Morphine weaning: Consider weaning if primarily "No" responses for ESC while on same dose for 24 hours and non-pharm care optimized.

- Wean morphine maintenance by 10% of maximum dose
- If initial wean tolerated, wean up to 20% of maximum dose daily
- Discontinue morphine when dose is less than or equal to:
0.02 mg/kg/dose **OR** 0.05 mg
- Monitor for at least 48 hours off morphine before discharge home

Algorithms are not intended to replace providers' clinical judgment or to create a single protocol. Some clinical problems may not be adequately addressed in this guideline. As always, clinicians are urged to document management strategies.

NAS pharmacological management algorithm

> Assess infant after feedings preferably while **skin-to-skin** or **held swaddled** by mother/caregiver

> Review ESC behaviors, which have occurred since last assessment using **Newborn Care Diary** with parents

> **Optimal non-pharm care: Breastfeeding** (if no medical contraindications), **rooming-in**, **parental presence**, **skin-to-skin**, **holding**, **swaddling**, **ad lib feeding** (at least q3), **quiet environment**, **limiting visitors**.

> If **YES** to any **ESC** item or **"3s"** for **"Soothing Support Used to Console Infant"** (i.e., difficulty responding to all caregiver soothing efforts OR does not soothe within 10 minutes), perform **team huddle** with mother/parent and RN to determine **non-pharm interventions** that can be optimized

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- **CONTACT NICU TO ARRANGE TRANSFER**

NICU/CCN dosing regimen:

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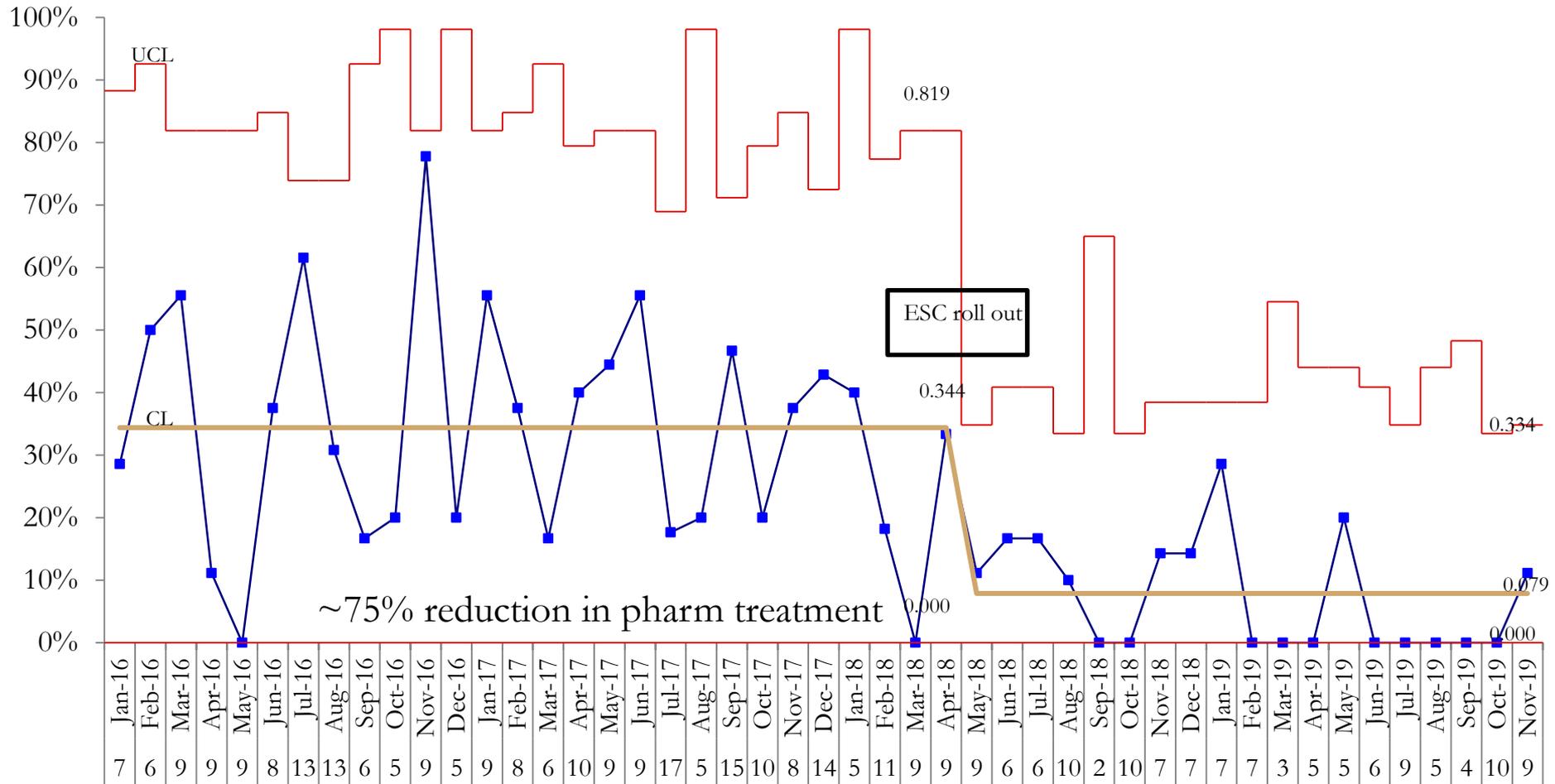
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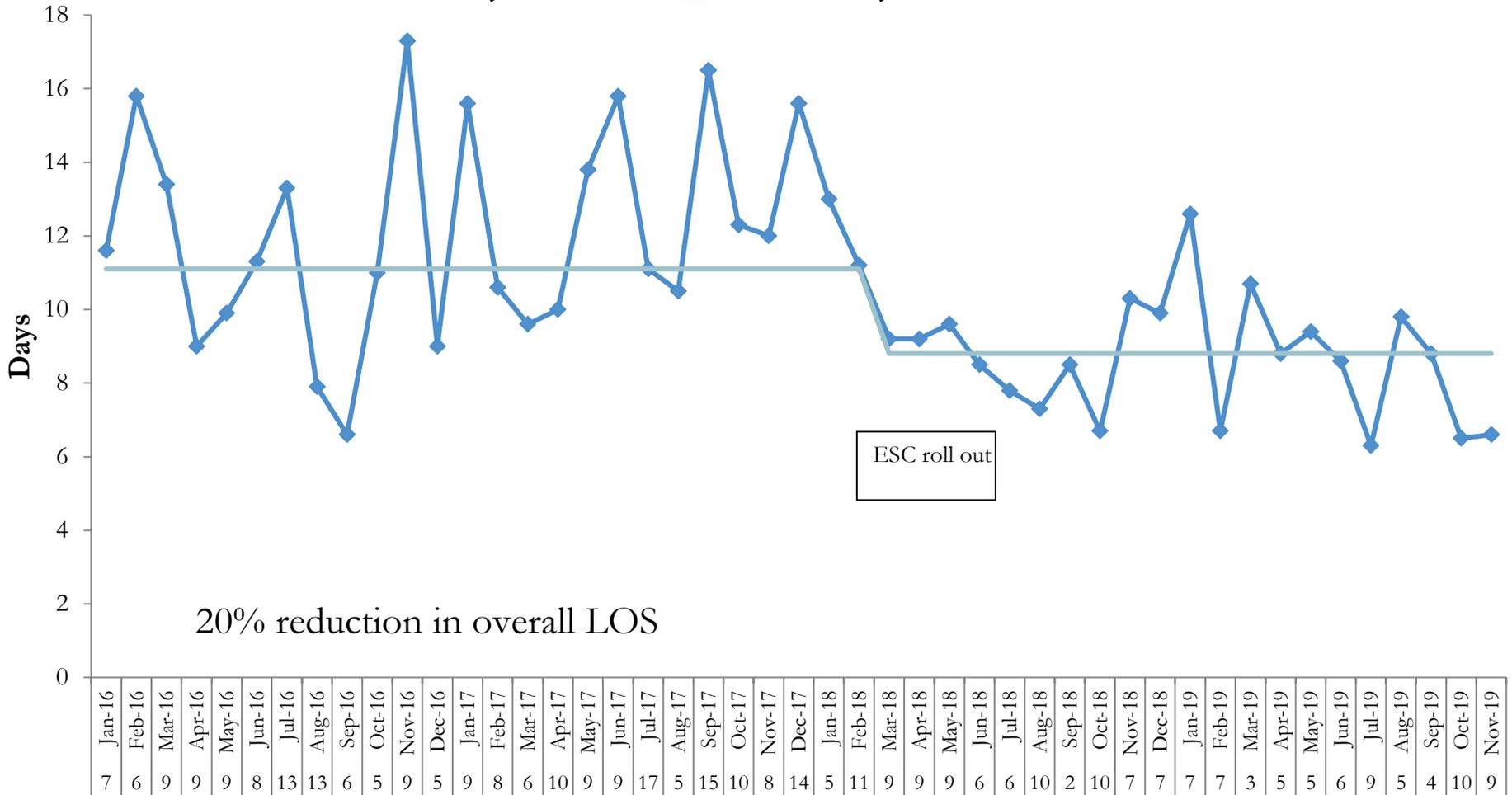
Results

Pharmacologically treated OEN ≥ 35 weeks (P-chart)



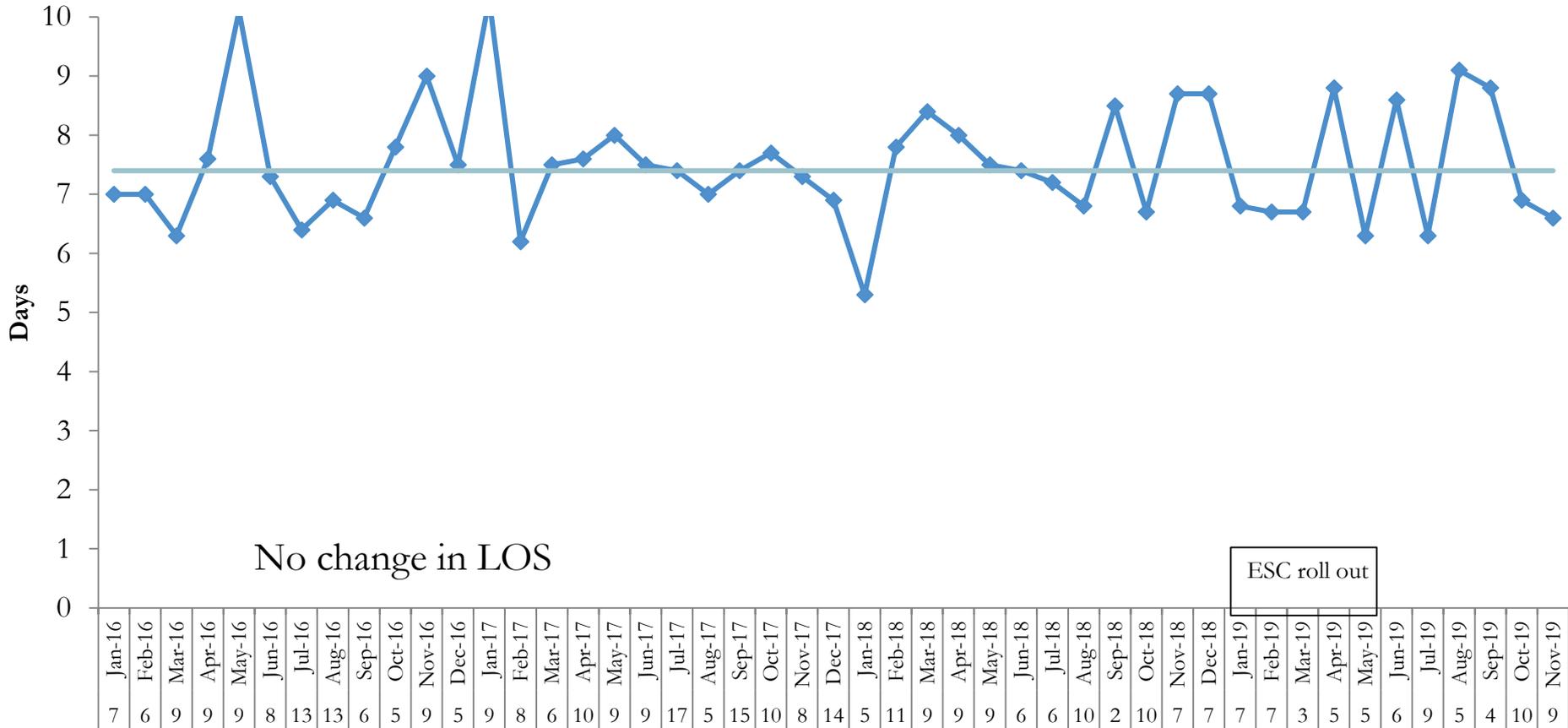
Results

LOS, all OEN ≥ 35 weeks, Run chart



Results

LOS, non-pharmacologic treated infants ≥ 35 weeks (Run chart)

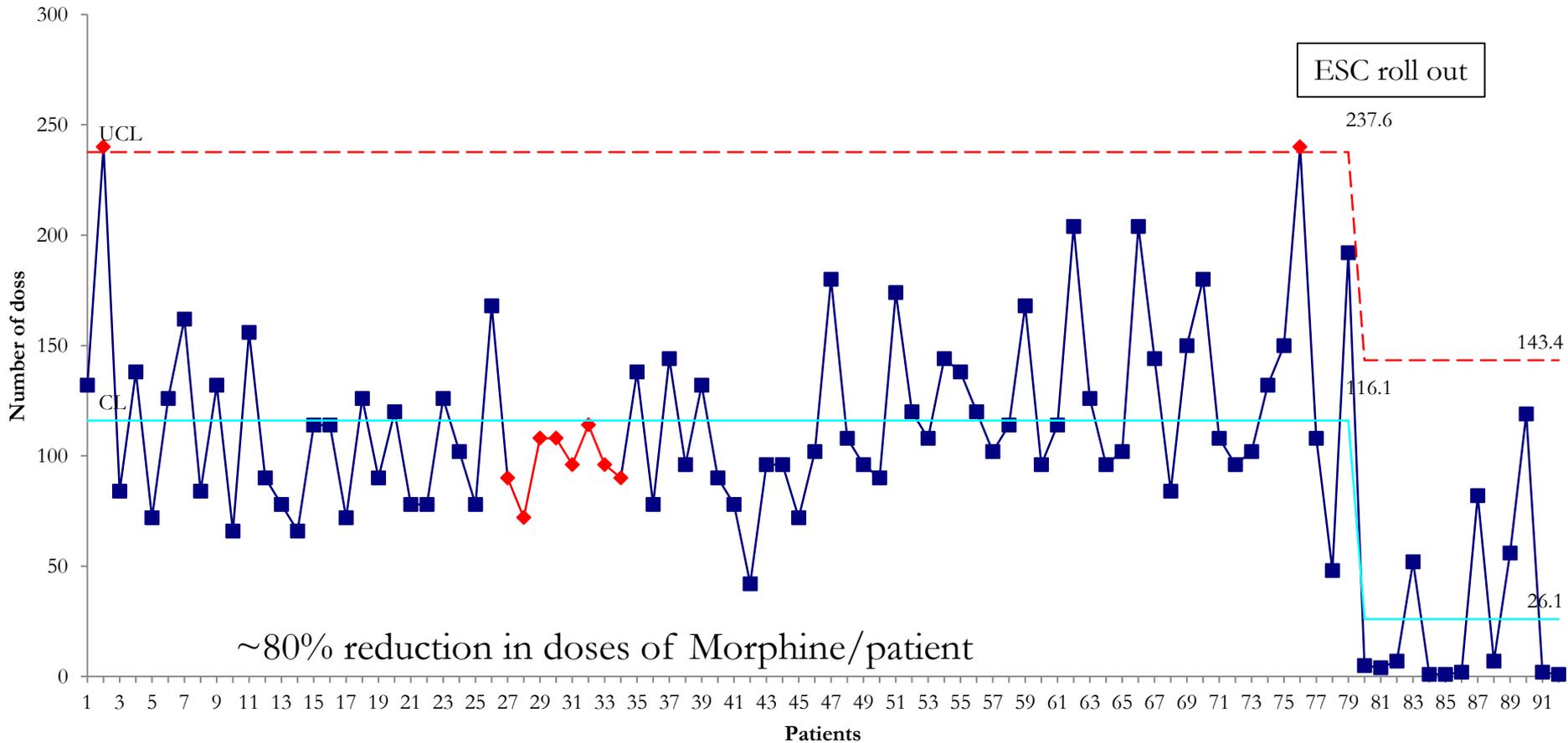


No change in LOS

ESC roll out

Impact of prn dosing for MMC

Number of Morphine doses per Pharmacologically treated patient (X Chart)



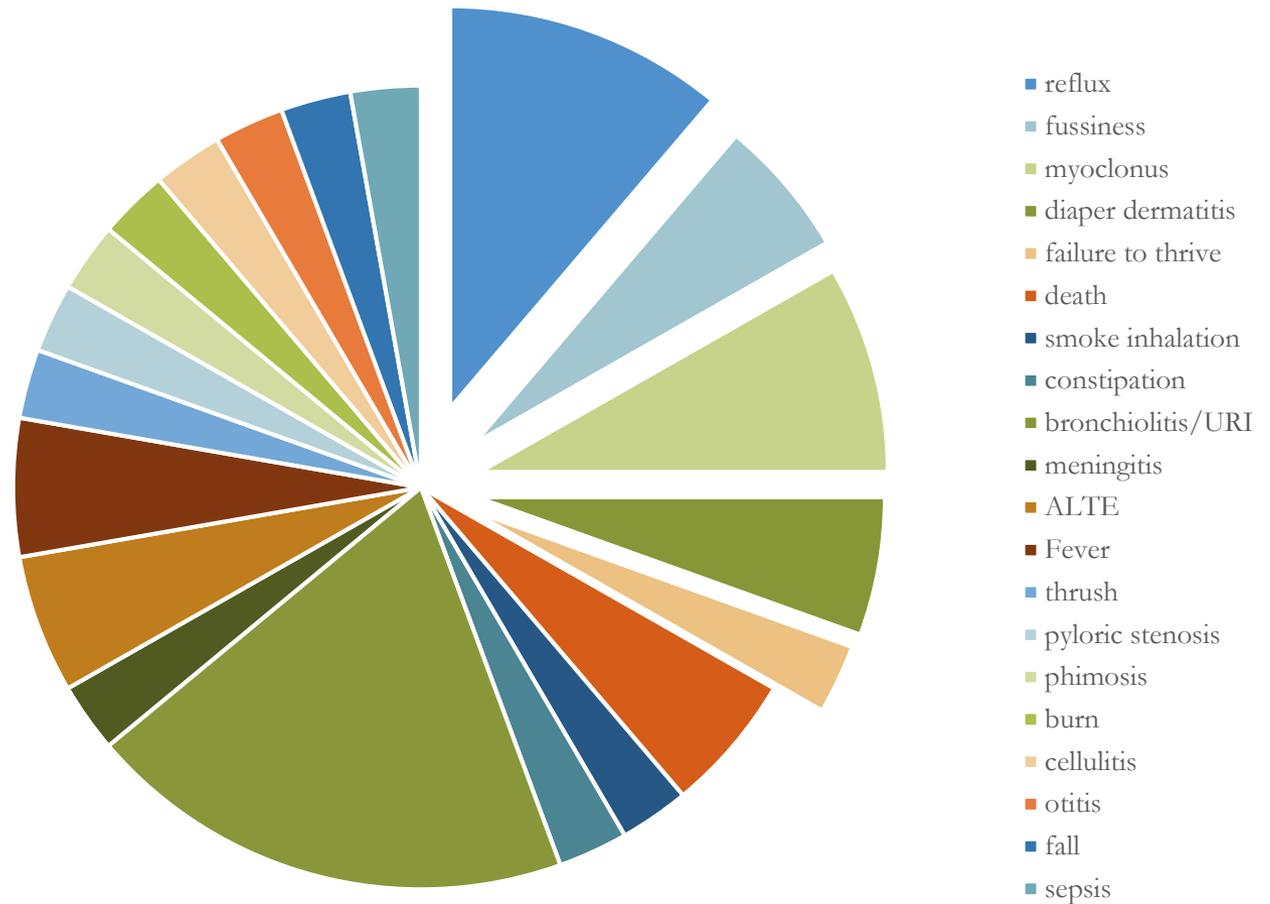
MMC impact of prn dosing

- Following implementation of ESC...
- We are pharmacologically treating ~75% less OENs
- Of the infants that received pharmacologic treatment:
 - 13 inborn infants ≥ 35 weeks treated pharmacologically for NAS
 - Median number of doses was 5
 - 5 of the 13 (38%) received either 1 or 2 doses of Morphine
 - The others received 4, 5, 7, 7, 52, 56, 82 and 119 doses of morphine respectively
(pre-ESC, the average number of Morphine doses was 116/patient)

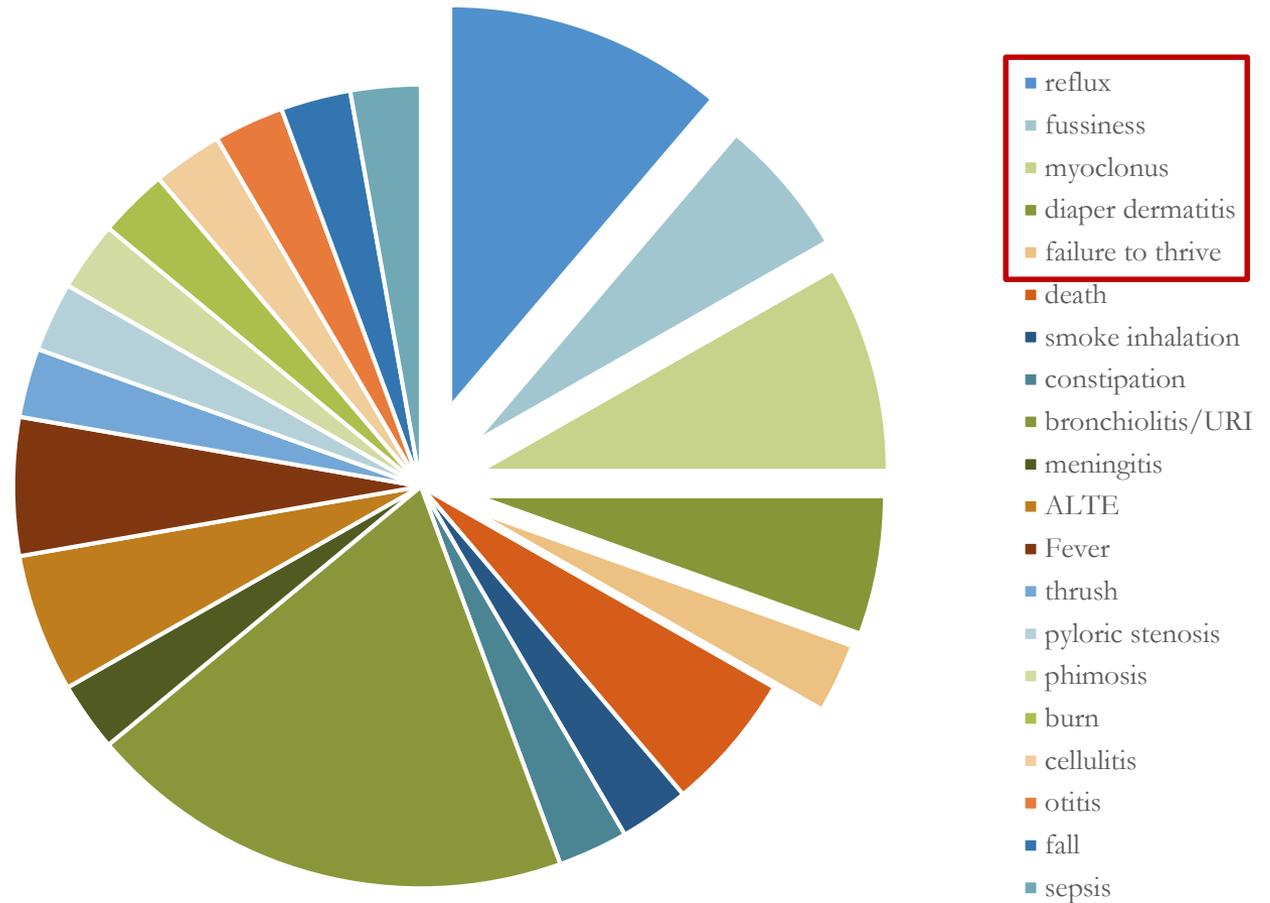
Readmission or ER encounter within 30 days of discharge

	Readmit/ER encounter	Percent
Pre-ESC baseline	23/312	8.97%
Post-ESC implementation	8/90	8.89%

Readmission or ER encounter within 30 days of discharge



Readmission or ER encounter within 30 days of discharge



Costs of care

	Direct cost	Contribution margin	Total cost	Net income	LOS (median)
Pharm treated	\$19,111	\$1,844	\$39,471	\$(18,515)	18 days
Non-pharm	\$3,669	\$3,266	\$8,373	\$(1,438)	6 days

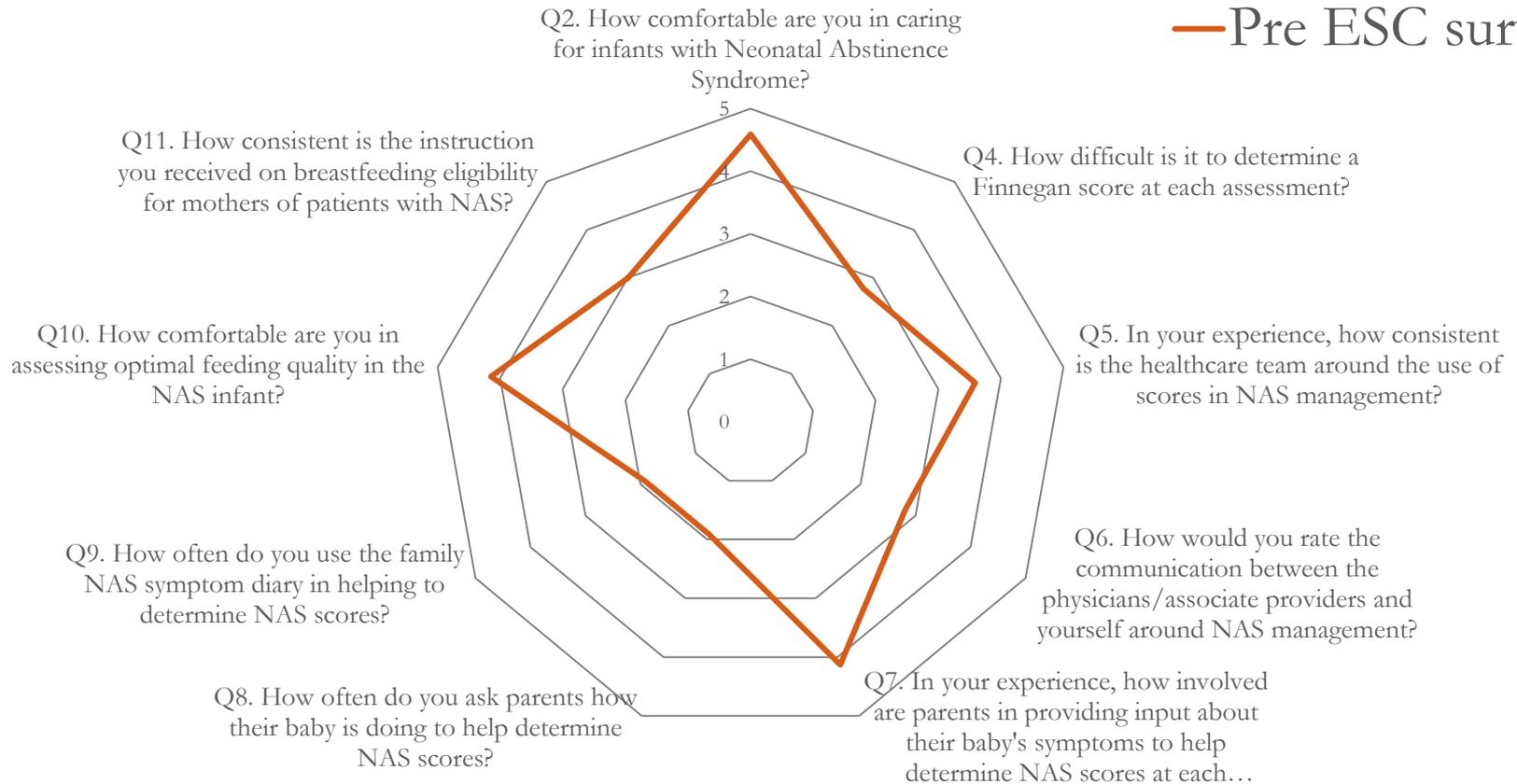
Anticipated cost savings in 2019:

Direct cost savings \$432k

Total cost savings \$870k

MMC Staff survey

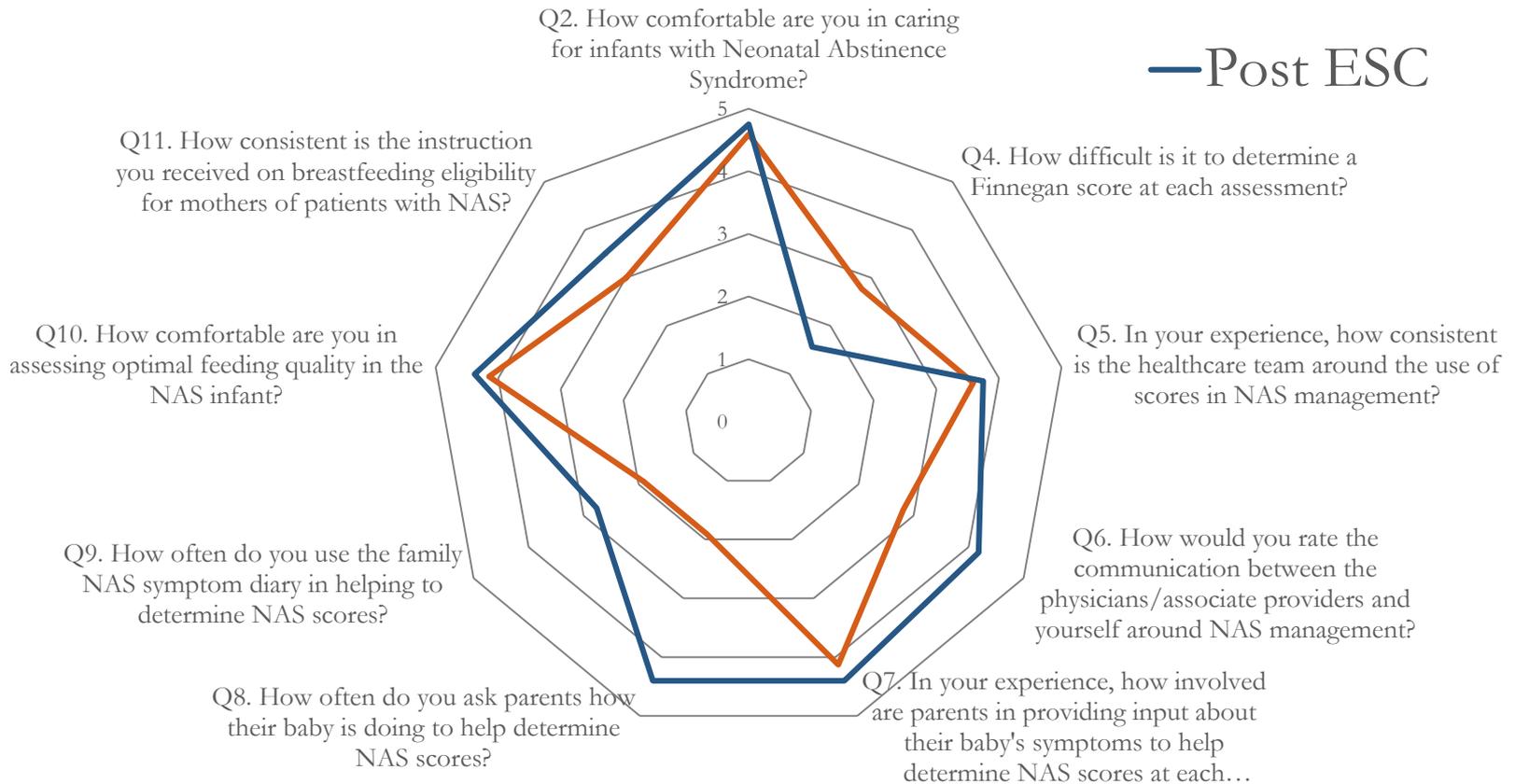
— Pre ESC survey



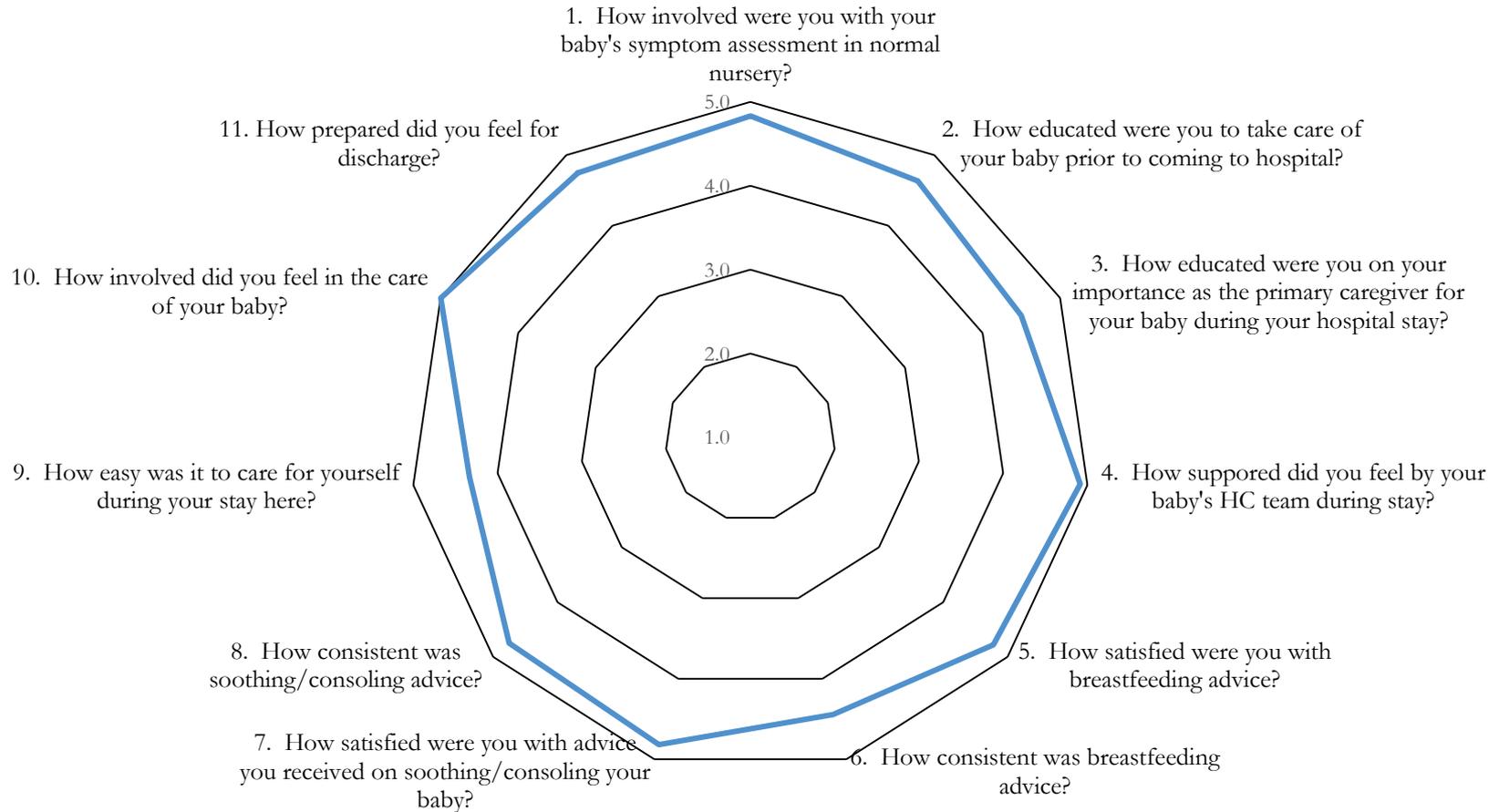
MMC Staff survey

— Pre ESC survey

— Post ESC



Parent Surveys



Parent surveys word cloud



NNEPQIN data

- Northern New England Perinatal Quality Improvement Network
- NAS project launched in 2017
- >2800 opioid-exposed newborns in database
- Hospitals across Vermont, New Hampshire, and now Maine
- Anticipate additional Maine hospitals contributing to the database in 2019

NNEPQIN

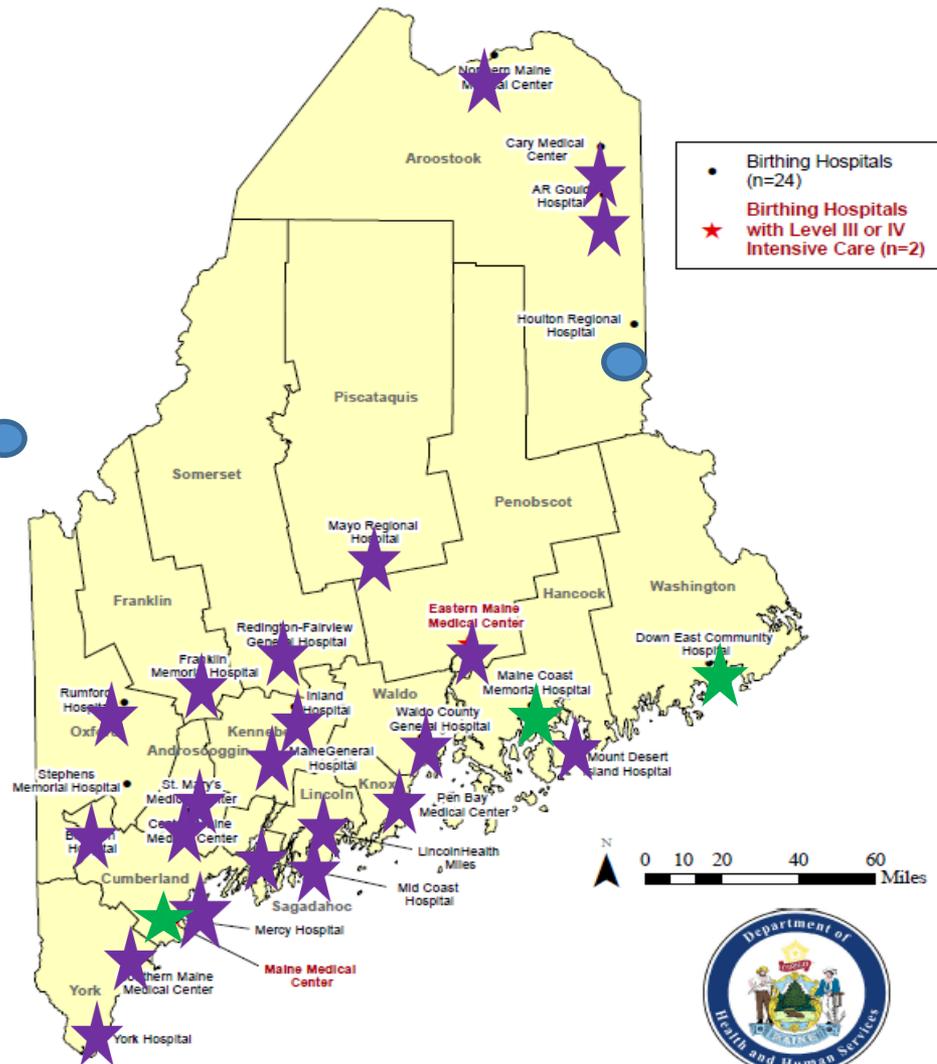


NNEPQIN timeline

- PDSA#1: Formal introduction of ESC Care Tool with NAS QI Collaborative with monthly webinars (February 2017)
- PDSA#2: Six in-person ESC training sessions with 35 NNEPQIN teams formally trained at Dartmouth
- PDSA #3: Systematic implementation of ESC care tool for care of SEN with 36 hospitals formally implemented as of 12/31/19
- PDSA #4: Ongoing collaborative review of data (>2800 SEN in database as of 12/31/19)
- PDSA#5: Introduction and review of regional collaborative hospital experience with prn dosing
 - Case reviews with data from early adopters

Implementation of ESC across Maine, December 2019

Implemented 
 In process 
 Had MQC education 

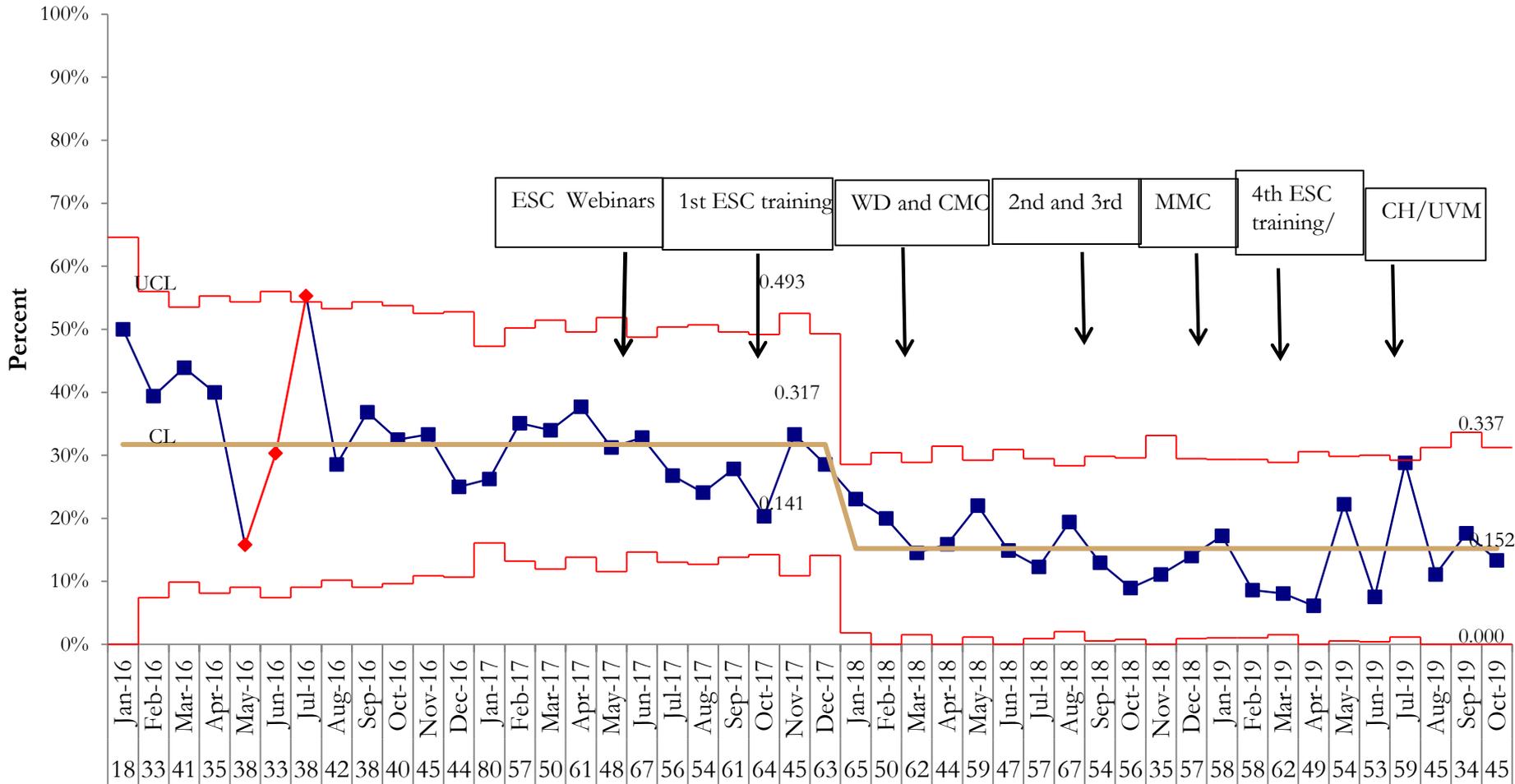


Updated in December 2018

Slide courtesy of K. Bowden

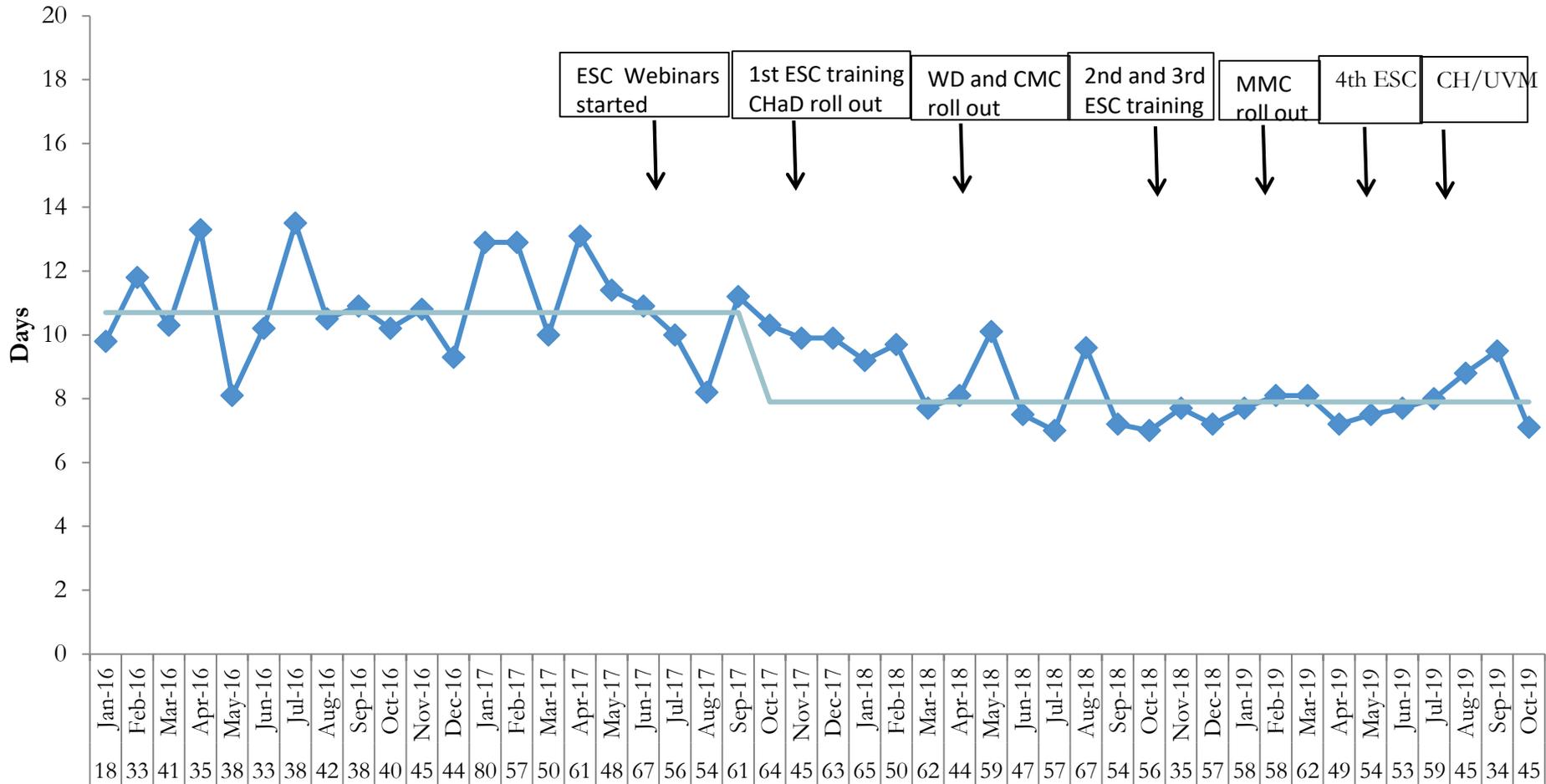
NNEPQIN Data

Percent SEN Requiring Pharmacologic Treatment ≥ 35 Weeks



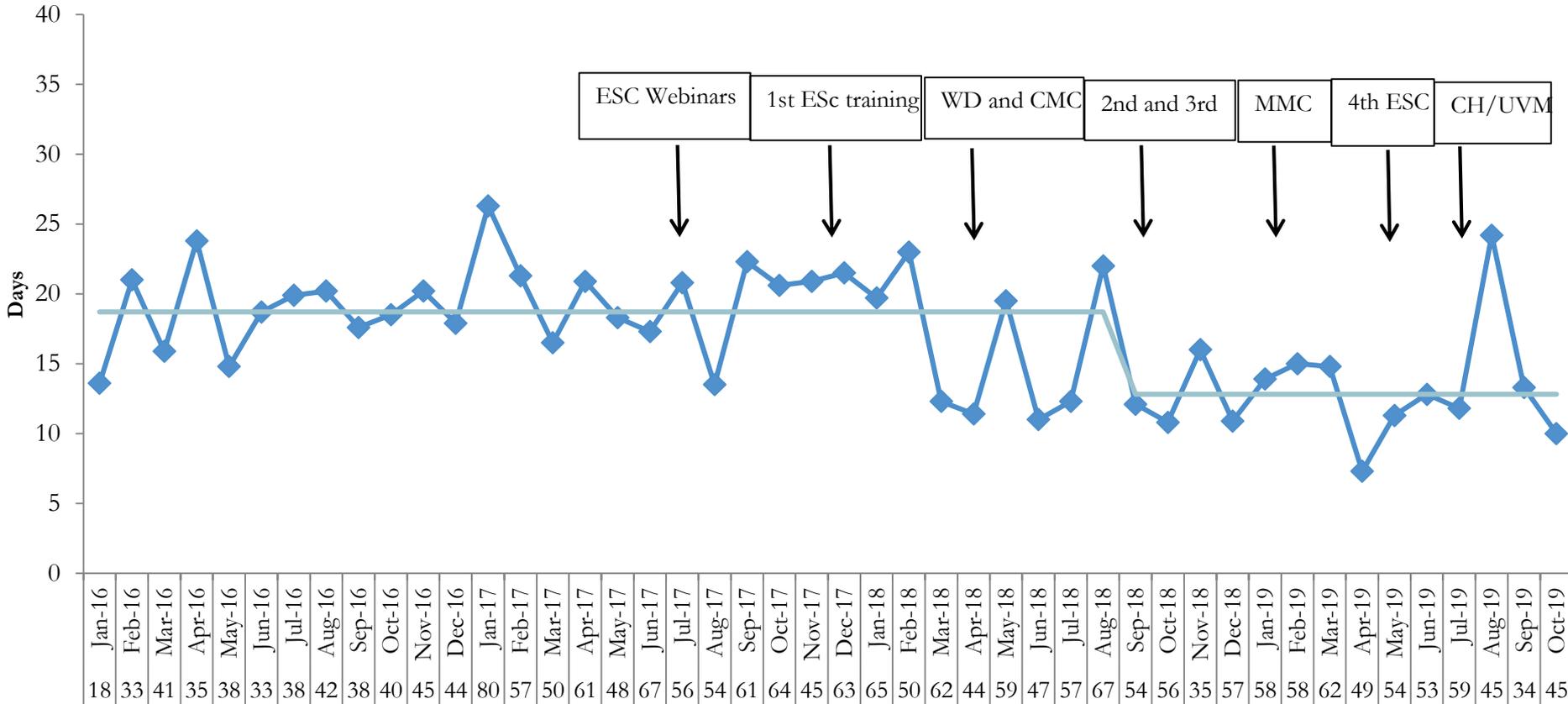
NNEPQIN Data

LOS, all exposed infants ≥ 35 weeks



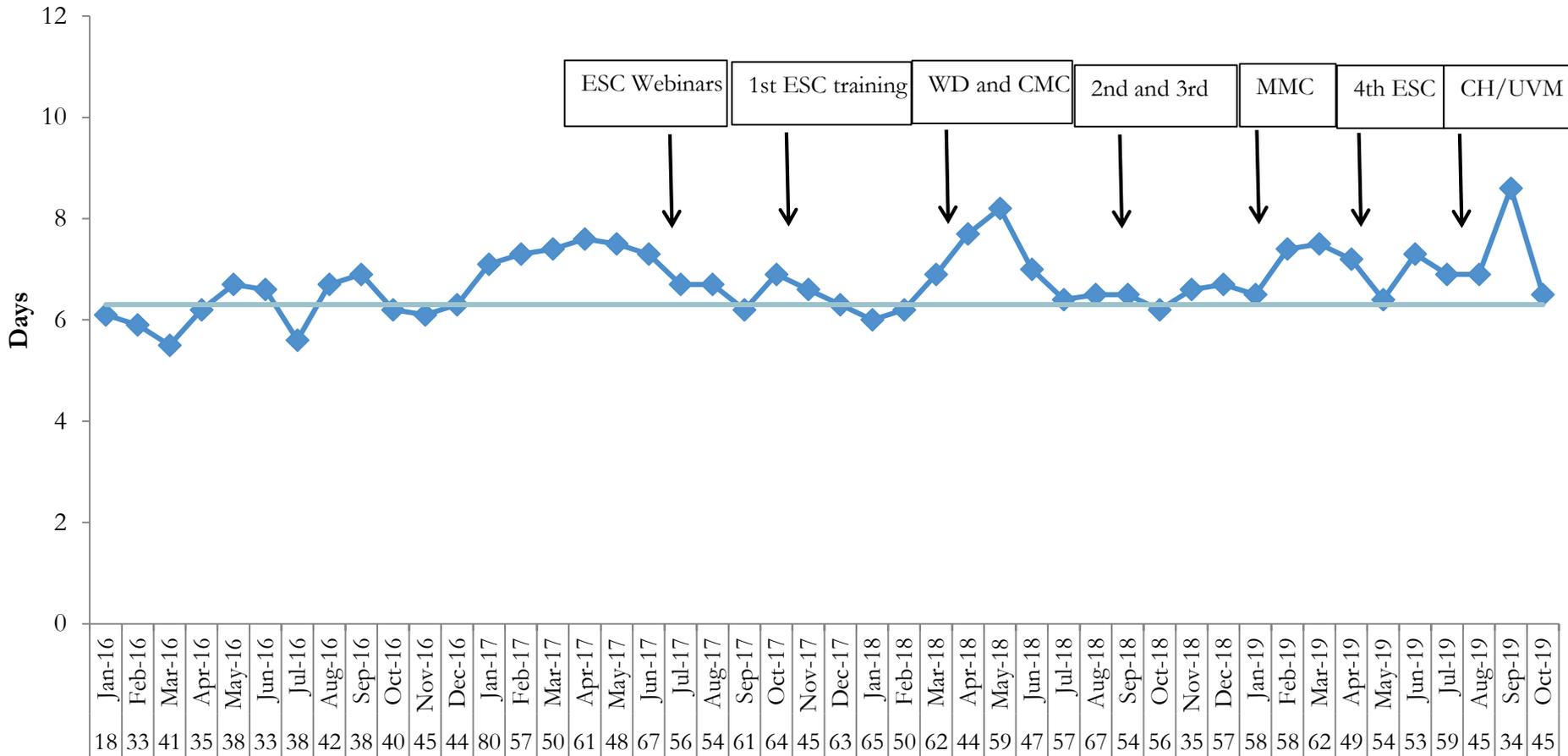
NNEPQIN Data

LOS, pharm Rx infants ≥ 35 weeks



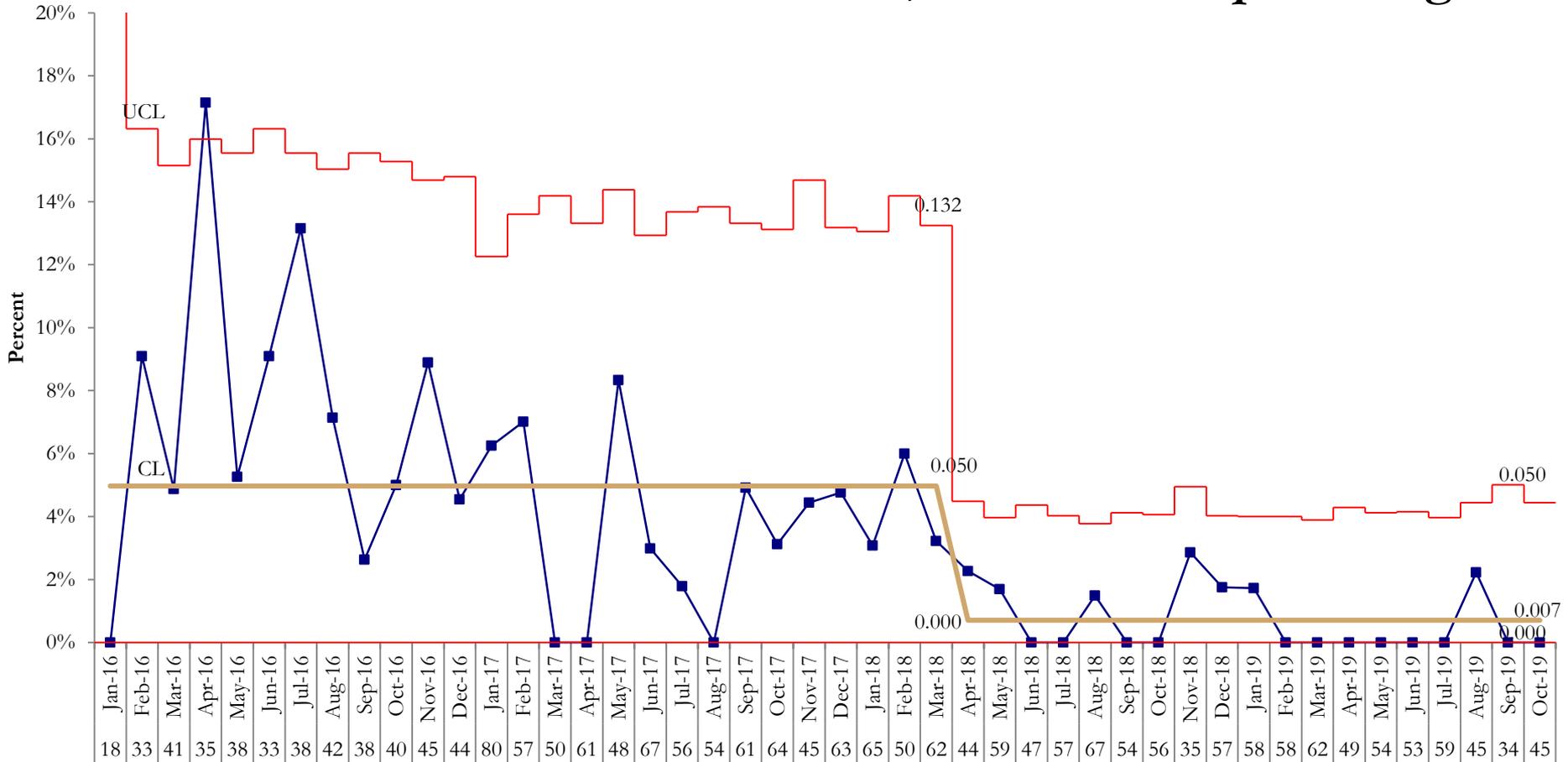
NNEPQIN Data

LOS, all non Rx infants ≥ 35 weeks



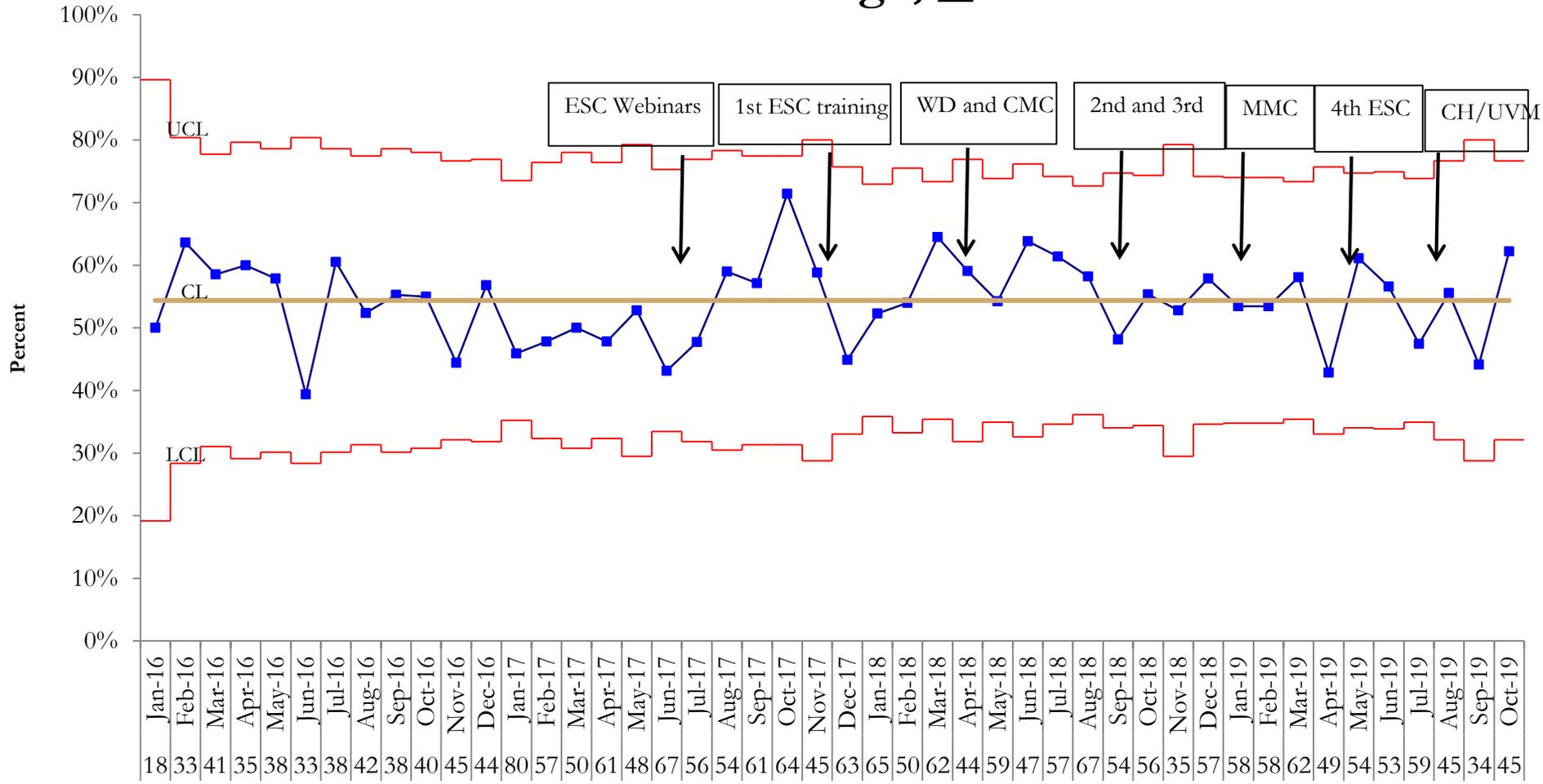
NNEPQIN Data

Infants ≥ 35 weeks, need for 2nd pharm agent



NNEPQIN Data

Percent BM at discharge, ≥ 35 weeks



Eat Sleep Console final thoughts, Part 1

- I still believe that some infants will require pharmacotherapy for their symptoms of withdrawal
- However....
 - ESC may allow for infants with “mild” withdrawal symptoms to not need pharmacotherapy
 - Potential for prn dosing of infants at peak withdrawal may reduce the longer duration of pharmacotherapy
 - » Morphine median 90 doses Methadone median 36 doses
 - ESC allows for symptom prioritization (i.e. only follow symptoms that are easy to recognize and are clinically important to families)
 - ESC allows the medical team a structure to encourage staff to provide family centered care for opiate exposed infants

Eat Sleep Console final thoughts, Part 2

- If your team does implement ESC, need a few things:
 - Strict training for staff
 - Support for families
 - Safe transition of care to outpatient providers
 - ? Follow up of ER visits or readmissions following discharge
- Do all opioid exposed newborn need to be transferred for higher levels of care/monitoring?
- What about if they are started on pharmacologic treatment?
 - These infants and families **need intensive caring, not intensive care units**
- Overall need for developmental follow up in both pharm-treated infants and infants managed without medications.

Take non-pharmacologic care to an 11!



Questions/Comments?





[Insert project title here]

[Insert presenter(s) name(s) here]

[Insert hospital name here]

Note: This is a template for illustrative purposes. You may you a hospital specific slide background if you desire, but should follow the general outline in this template. v1

Our Team



[replace picture below with team picture and/or team member names]



SMART Aim(s)



- **[insert SMART aim(s) here]**
- *Example: We aim to decrease length of stay among newborns diagnosed with NAS in participating GaPQC hospitals from 11.2 days to 10.1 days by 9/30/21*
- *You may have multiple aims related to process, outcome, balancing and patient-family centered measures*



Key Driver Diagram



- [insert key driver diagram onto next slide and delete this slide]
- *The key driver diagram should reflect your hospital's SMART aim and the drivers you plan to address. You should include interventions you are considering to test and potentially implement*



SMART Aim

We aim to decrease length of stay among newborns diagnosed with NAS in participating GaPQC hospitals from 16.3 days to 14.7 days by 9/30/221

Global Aim

Improve care for babies and mothers impacted by NAS

Primary drivers

Improve identification of mothers and infants at risk

Increase reliability of scoring for symptoms of NAS

Increase non-pharmacologic treatment

Provide family-centered care / avoid mother-infant separation

Reduce pharmacologic treatment

Reduce variation in treatment of infants with NAS

Improve transition to home, engaging parents

Interventions

Develop standard screening guidelines

Educate staff on scoring

Assess inter-rater reliability of scoring

Use Eat, Sleep, Console

Increase breastfeeding

Use non-pharmacologic bundles of care

Use a standard opioid treatment protocol

Back-transfer infants stabilized on treatment

Collaborate with support organizations/agencies

Provider education to reduce stigma



PDSA cycles



- [Uses up to 2-3 slides to describe PDSA cycles you have tested]
- *The slides should highlight the driver(s) addressed and how the PDSA was tested (e.g. in 1 patient, 5 patients, etc.) and what was learned and decided (was the intervention adopted, adapted or abandoned)*



Run chart



- [Uses the next slide to share your hospital-specific data, if available]
- *You may or may not be at this point. It is okay not to have a run chart. However, you can share your baseline data from the GaPQC reports sent to you. Copy the graph from the excel template to this form.*



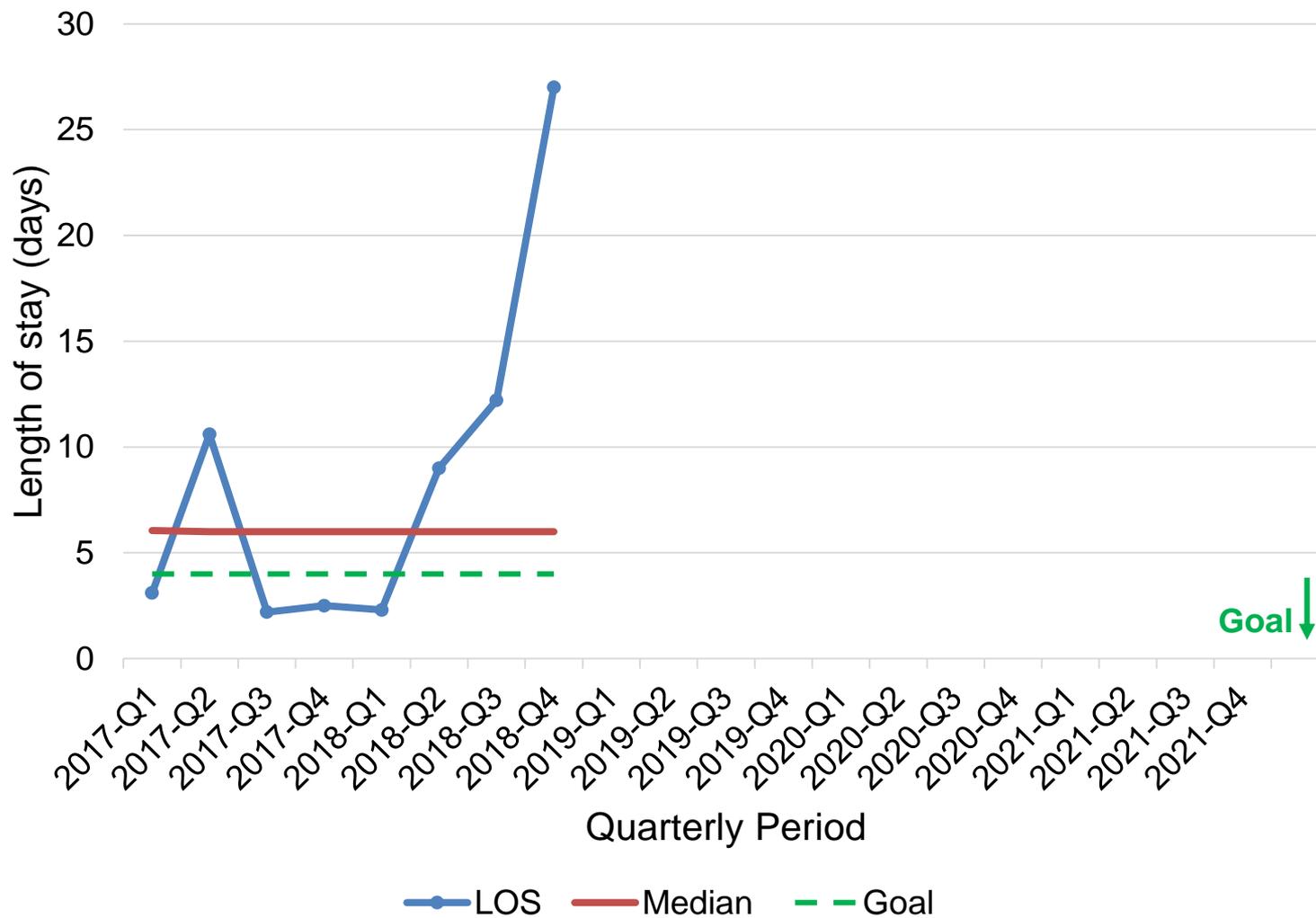
Run chart



- [Use the next slide to share your hospital-specific data, if available]
- *You may or may not have this available. It is okay not to have a run chart at this point in the initiative. However, you can share your baseline data from the GaPQC reports sent to you. Copy the graph from the excel template to replace the one on the next page.*



Run Chart: Length of stay for opioid exposed newborns



Barriers and Learnings



- [Use this final presentation slide(s) to highlight barriers and learnings. May use up to 2 slides]
- *Highlight the main learnings so far and barriers you have encountered and how you may have overcome them. What you have learned will be helpful to other centers.*



Acknowledgements



- [Optional slide: If you wish to acknowledge others as part of your improvement efforts]



Reminders



- Next call will be **2/11** on **NAS Scoring**
- The **GaPQC Annual Meeting** will be **April 23rd and 24th**
- We will be switching to **Microsoft Teams**

