The Barbara Bush Children's Hospital
At Maine Medical Center

Hospital Care of the Opioid Exposed Newborn

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Maine Substance Use Disorder Learning Collaborative

July 24, 2024

BEST REGIONAL HOSPITALS U.S.News & World Report COASTAL MAINE RECOGNIZED IN 9 TYPES OF CARE 2016-17

MAGNET RECOGNIZED AMERICAN NURSES CREDENTIALING CENTER

The Joint Commission National Quality Approval

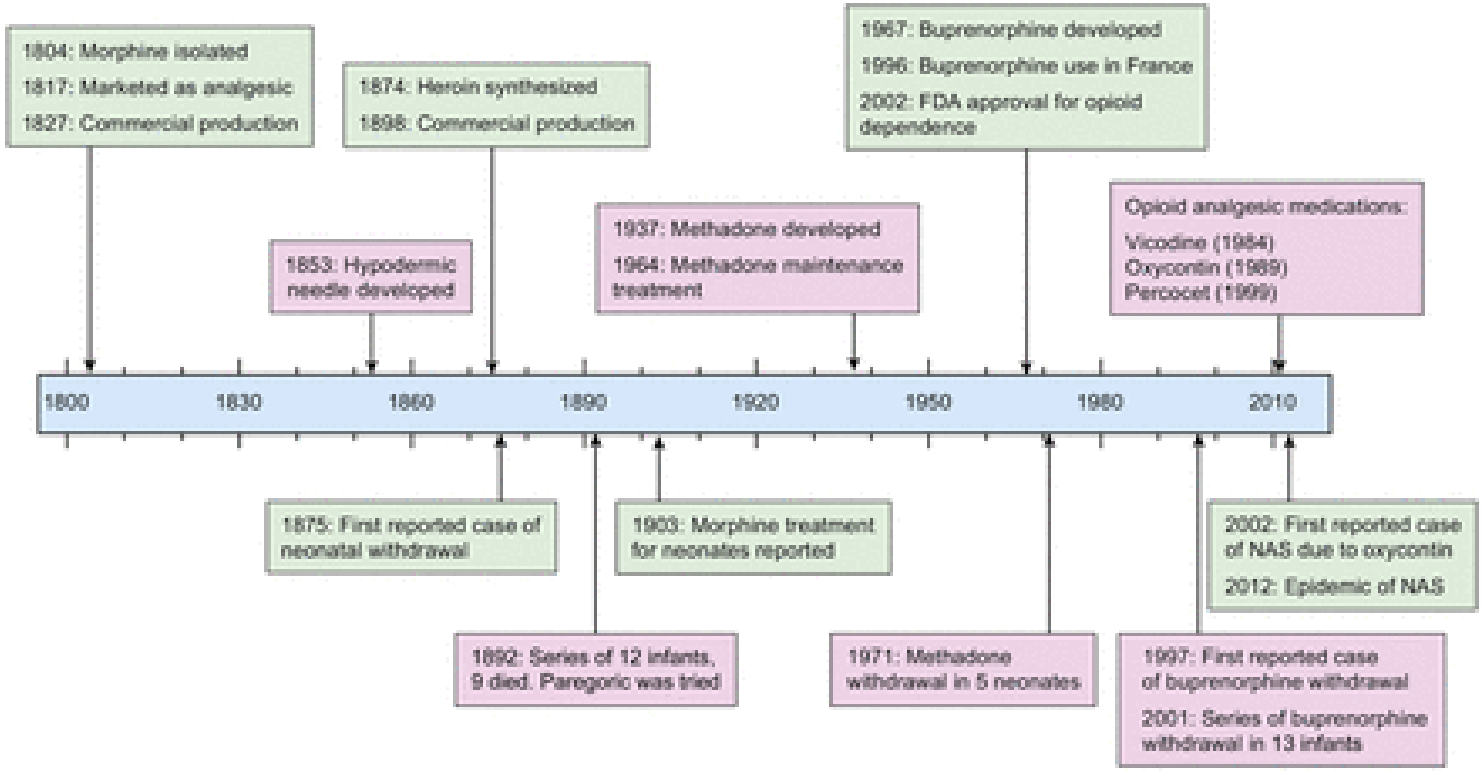
Disclosures

- I have no relevant financial disclosures
- Thank you to Dr. Jamie Fey – many of these slides are from her!

Objectives

- Review the history of hospital management of neonatal abstinence syndrome and provide context for the changes that have occurred in this realm in the past decade
- Discuss the Eat, Sleep, Console protocol as an evidence-based tool in the treatment of neonatal opioid withdrawal syndrome (NOWS)
- Review that Eat, Sleep, Console focuses on the comfort and care of substance exposed infants by maximizing nonpharmacologic methods, increasing family involvement in the treatment of their infant and “as-needed” use of morphine

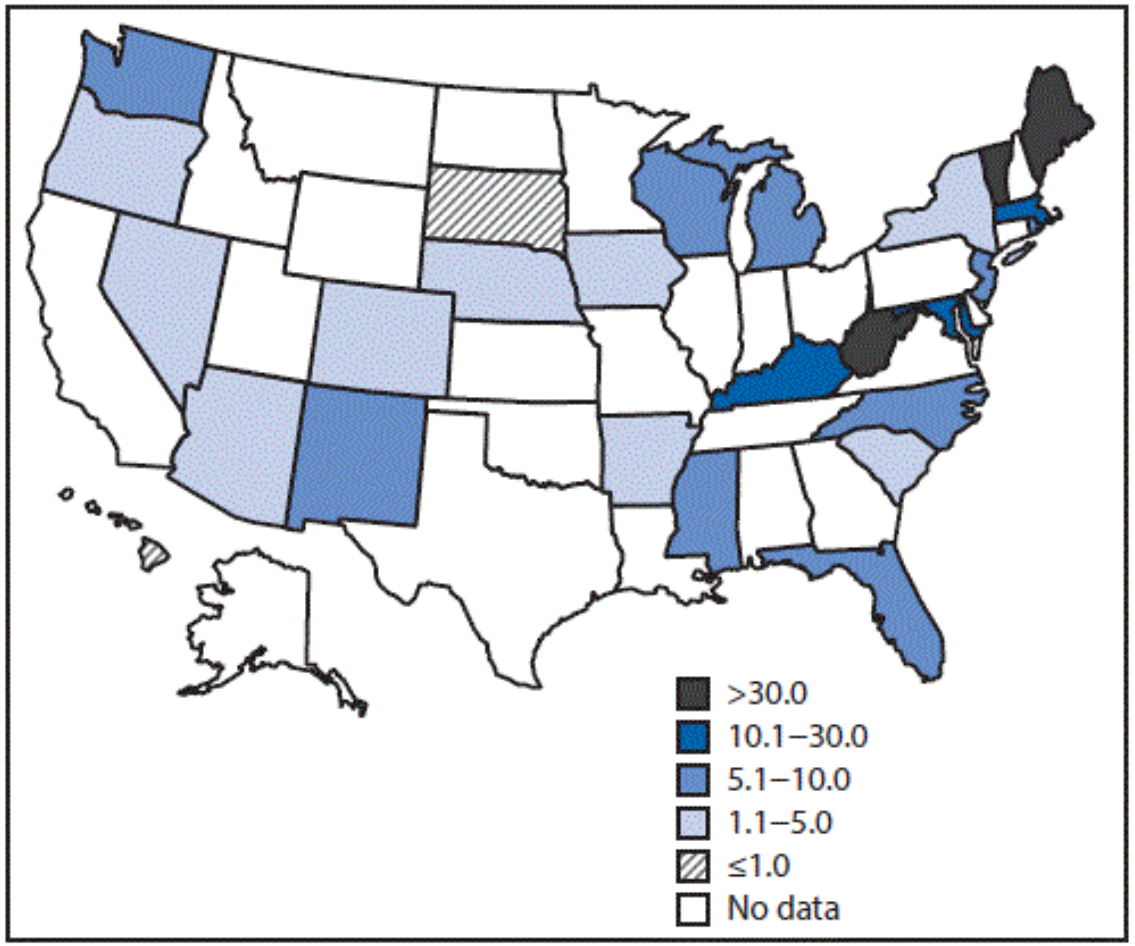
Neonatal abstinence syndrome



Source: Kocherlakota P. Neonatal Abstinence Syndrome. *Pediatrics*. 2014; 134(2): e547-561.

Terminology

Term	**Definition**
Neonatal abstinence syndrome (NAS)	Neonatal withdrawal after any addictive substance exposure
Neonatal opioid withdrawal syndrome (NOWS)	A subset of NAS, neonatal withdrawal after exposure to opiate medications
Substance exposed newborn (SEN)	Infant affected by prenatal exposure to substances such as prescribed medications, alcohol, illicit drugs and tobacco
Opiate exposed newborn (OEN)	A subset of SEN, infant affected by prenatal exposure to opiates (prescribed and illicit)



NAS cases per 1,000 live births, 2012-2013
Source: State Inpatient Databases, Healthcare Cost and Utilization Project

NAS in Maine by County

COUNTY	**2004	**2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
ANDROSCOGGIN	5	14	18	19	37	36	55	82	97	121	104	128	134
AROOSTOOK	1	13	12	19	31	25	35	36	59	67	58	60	76
CUMBERLAND	14	25	32	40	41	56	50	69	63	102	109	103	83
FRANKLIN	0	0	1	1	6	4	10	13	15	16	7	16	10
HANCOCK	1	3	14	8	14	12	21	26	33	30	37	36	38
KENNEBEC	2	10	11	33	36	69	73	84	89	103	102	83	109
KNOX	2	4	4	6	9	9	20	23	37	32	19	27	36
LINCOLN	2	2	3	6	7	3	8	11	17	13	30	23	18
OXFORD	0	5	5	7	14	11	7	19	11	27	34	28	32
PENOBSCOT	12	48	65	73	81	139	162	155	187	182	226	239	213
PISCATAQUIS	0	3	3	7	3	7	8	1	18	15	16	24	21
SAGADAHOC	2	2	1	2	6	3	8	6	9	17	8	15	10
SOMERSET	1	4	7	13	16	21	28	42	43	70	56	59	58
WALDO	2	4	2	12	17	16	26	29	23	29	32	33	54
WASHINGTON	1	7	8	9	6	21	18	27	32	47	41	42	41
YORK	7	18	11	18	18	18	38	43	38	55	82	96	91
Unknown/Non-Maine Resident	1	3	4	1	1	1	5	2	1	1	0	1	0
TOTAL	**53**	**165**	**201**	**274**	**343**	**451**	**572**	**668**	**772**	**927**	**961**	**1013**	**1024**

Table 2. Clinical Manifestations and Outcomes of the Neonatal Abstinence Syndrome.*

Metabolic, vasomotor, and respiratory manifestations
Fever
Frequent yawning
Sneezing
Sweating
Nasal stuffiness
Respiratory rate >60 breaths per minute, with or without retractions
Mottling
Tachypnea
Gastrointestinal manifestations
Projectile vomiting
Regurgitation
Loose or watery stools
Weight loss
Poor feeding
Excessive sucking
Central nervous system manifestations
Tremors
High-pitched crying
Sleep disturbances
Increased muscle tone
Excoriation
Myoclonic jerks
Irritability
Seizures
Outcomes
Admission to neonatal intensive care unit
Pharmacologic treatment for 60–80% of infants
Prolonged hospitalization (average, 17 days)
Increased risk of birth complications (e.g., low birth weight, jaundice, and feeding difficulties)
Disrupted bonding
Child-safety concerns

* Data on manifestations are from Finnegan et al.,[1] Newnam et al.,[34] and D'Apolito,[35] and data on outcomes are from Patrick et al.,[5,6] Jansson and Velez,[23] Lee et al.,[24] Uebel et al.,[36] Cleary et al.,[37] and Wachman et al.[38]

Source: McQueen, K. et al. N Engl J Med 2016; 375:2468-2479

Finnegan Score – The old way!

Signs	Score
Cry	
Continuous high pitched cry	2
Continuous high pitched cry	3
Sleep after feeding	
> 3 hours	0
< 3 hours	1
< 2 hours	2
< 1 hour	3
Moro	
Normal	0
Hyperactive	2
Markedly hyperactive	3
Tremors	
Mild tremors disturbed	1
Moderate to severe tremors disturbed	2
Mild tremors undisturbed	3
Moderate to severe tremors undisturbed	4
Tone	
Normal muscle tone	0
Increased muscle tone	2
Excoriation	
No	0
Yes-specific area	1
Myoclonic Jerks	
No	0
Yes	3
Respiratory Rate	
Normal (0)	0
> 60/min w/o retractions	1
> 60/min with retractions	2

Signs	Score
Generalized Convulsion	
No	0
Yes	5
Sweating	
No	0
Yes	1
Fever	
Normal	0
Fever 100.4-101 F	1
Fever > 101 F	2
Yawning	
< 3 times/interval	0
> 3-4 times/interval	1
Mottling	
No	0
Yes	1
Nasal Stuffiness	
No	0
Yes	1
Sneezing	
Moderate to no sneezing	0
Sneezing > 3-4x/interval	1
Nasal flaring	
No nasal flaring	0
Nasal flaring	2
Excessive Sucking	
No	0
Yes	1
Poor Feeding	
No	0
Yes	2

Medication Safety

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), *Journal of Pediatrics,* Victorian Infant Brain Cohort

- At 2 years, morphine-exposed children were more likely to show behavioral dysregulation (P=0.007 than no-morphine children, but at 7 years no detrimental impacts of morphine on neurobehavioral outcome were observed

Towers et al (2019), *Pediatrics*

- NAS infants have statistically smaller head circumference than controls, 30% of infants with NAS had HC < 10th percentile, vs 8% of infants with no NAS

Slide courtesy of Dr. Alan Picarillo

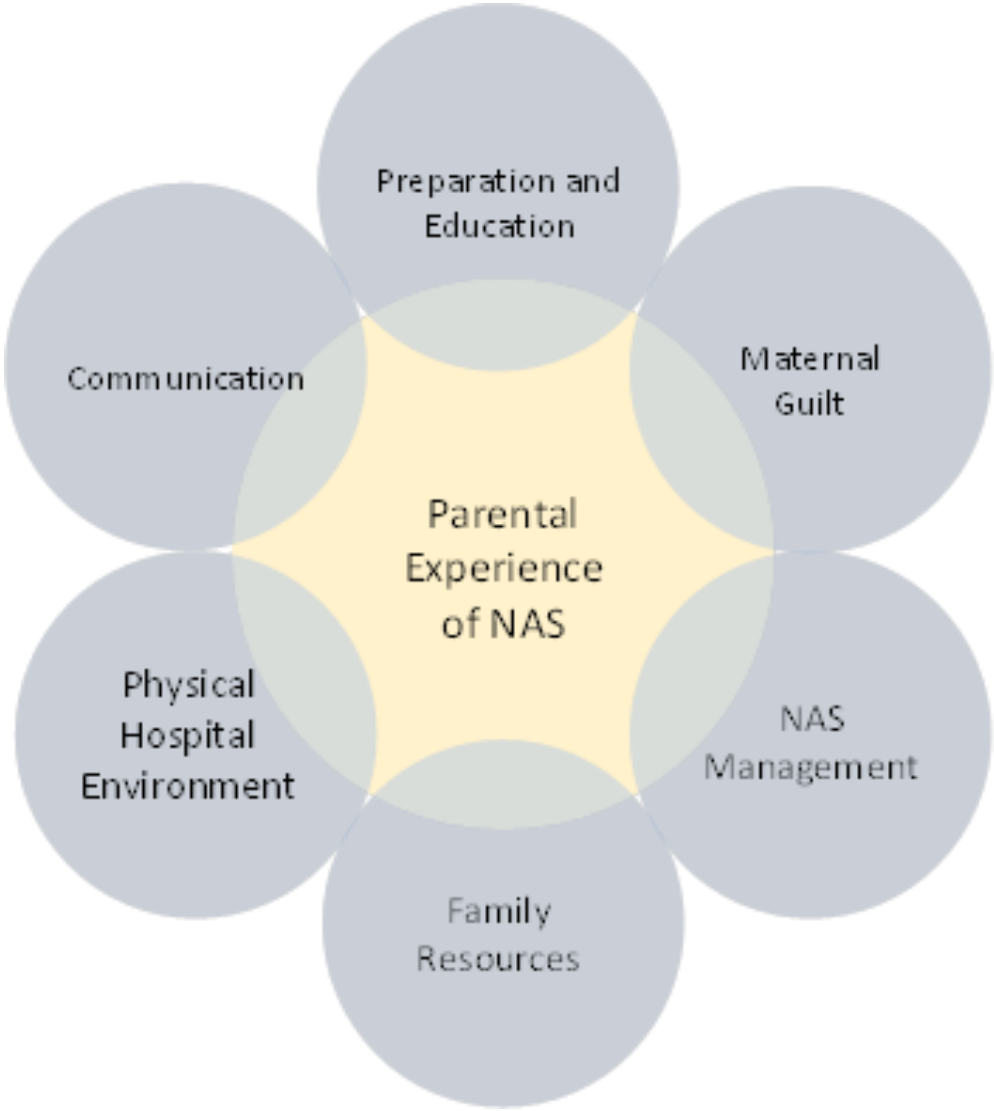
Family experience

Five themes:

1. Parents desire for education regarding the course and treatment of NAS
2. Parents valuing their role in the care team
3. Quality of interactions with staff, communication regarding clinical course
4. Transfers between units and inconsistencies among providers
5. External factors

Source: Atwood E, et al. A Qualitative Study of Family Experience With Hospitalization for Neonatal Abstinence Syndrome. *Hospital Pediatrics*. 2016; 6(10): 626-632.

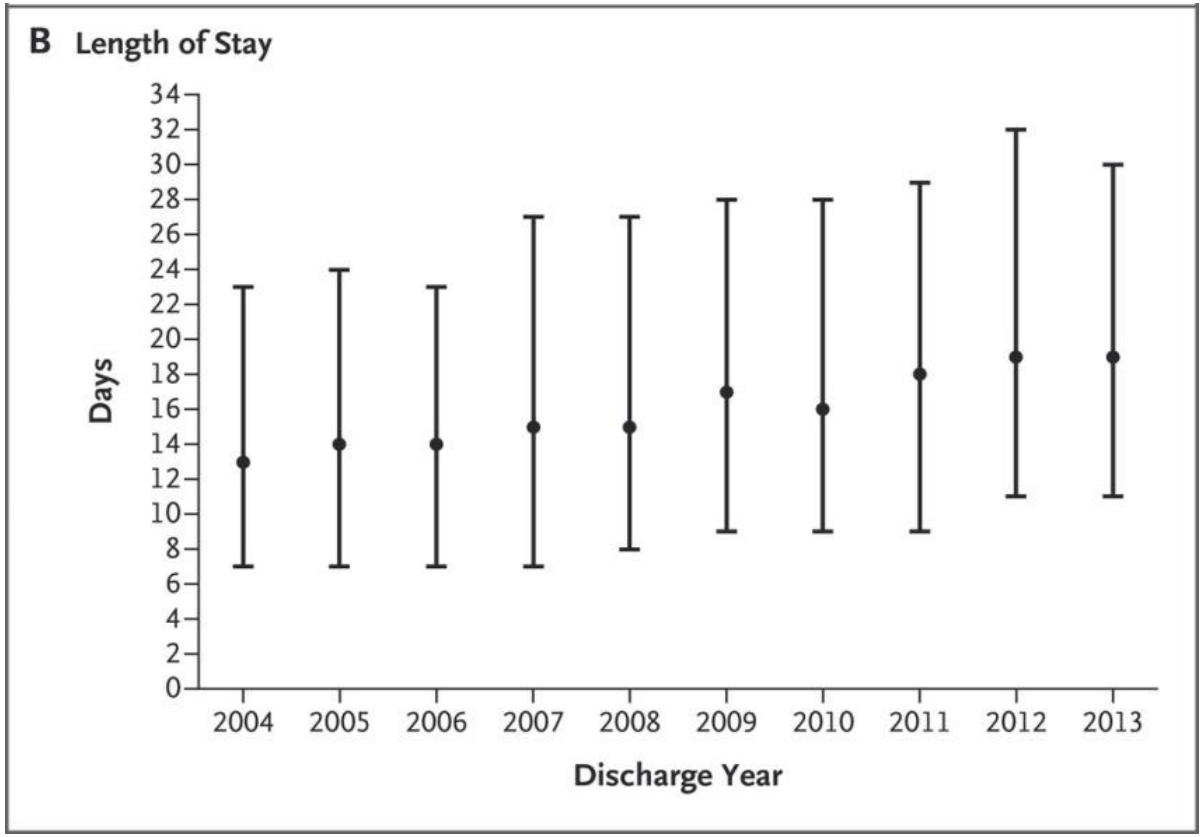
Primary Themes



Source: Buczkowski A, et al. J Addict Med: 2020

Length of Stay

2004-2013 median LOS increased from 13 to 19 days



Tolia VN et al. N Engl J Med 2015;372:2118-2126

National Statistics on Cost

- 4 Million birth in US/year
  - 24,000 NAS infants born in US (66 per day)
- Mean length of stay 23 days
  - Each day in the US, there are >1500 hospitalized NAS infants
- Cost $93,400/infant
  - $2.2 billion in costs for initial hospitalization
  - >80% are Medicaid

Maine Medical Center (8% of infants at MMC dx with NAS)

	2013	2014	2015	2016	Total
LOS tx	18	24	24	20	21
LOS no tx	7	7	6	6	6.6
Charges tx	$71,012	$104,561	$102,451	$86,863	$88,716
Charges no tx	$22,889	$22,037	$21,711	$21,501	$22,252
Payments tx	$16,216	$15,904	$13,897	$9,077	$15,120
Payments no tx	$7,229	$6,668	$6,207	$7,084	$6,868
Treatment rate	43%	45%	42%	35%	43%

Slide adapted from Olivia Avidan, MS2

YALE STUDY

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

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abstract

BACKGROUND AND OBJECTIVES: The incidence of neonatal abstinence syndrome (NAS), a constellation of neurologic, gastrointestinal, and musculoskeletal disturbances associated with opioid withdrawal, has increased dramatically and is associated with long hospital stays. At our institution, the average length of stay (ALOS) for infants exposed to methadone in utero was 22.4 days before the start of our project. We aimed to reduce ALOS for infants with NAS by 50%.

METHODS: In 2010, a multidisciplinary team began several plan-do-study-act cycles at Yale New Haven Children's Hospital. Key interventions included standardization of nonpharmacologic care coupled with an empowering message to parents, development of a novel approach to assessment, administration of morphine on an as-needed basis, and transfer of infants directly to the inpatient unit, bypassing the NICU. The outcome measures included ALOS, morphine use, and hospital costs using statistical process control charts.

RESULTS: There were 287 infants in our project, including 55 from the baseline period (January 2008 to February 2010) and 44 from the postimplementation period (May 2015 to June 2016). ALOS decreased from 22.4 to 5.9 days. Proportions of methadone-exposed infants treated with morphine decreased from 98% to 14%; costs decreased from $44 824 to $10 289. No infants were readmitted for treatment of NAS and no adverse events were reported.

CONCLUSIONS: Interventions focused on nonpharmacologic therapies and a simplified approach to assessment for infants exposed to methadone in utero led to both substantial and sustained decreases in ALOS, the proportion of infants treated with morphine, and hospital costs with no adverse events.

Infants exposed to opioids in utero may develop neonatal abstinence syndrome (NAS), a constellation of neurologic, gastrointestinal, and musculoskeletal disturbances associated with opioid withdrawal.[1] At our institution, infants exposed to methadone in utero who developed signs of withdrawal were given a diagnosis of NAS. The number of infants at Yale New Haven Children's Hospital (YNHCH) exposed to methadone in utero increased by 74% from 2003 to 2009, and the average length of stay (ALOS) in 2008 to 2009 was 22.4 days, longer than almost all other primary inpatient diagnoses at our institution. In addition, these

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Dr Grossman conceptualized and designed the project, drafted the initial manuscript, and coordinated data collection; Drs Berkwitt and Osborn helped design the project, collected data, and critically reviewed the manuscript; Ms Xu and Dr Esserman carried out the statistical analysis and critically reviewed the manuscript; Dr Shapiro helped analyze data and critically reviewed the manuscript; Dr Bizzarro helped design the project and critically reviewed the manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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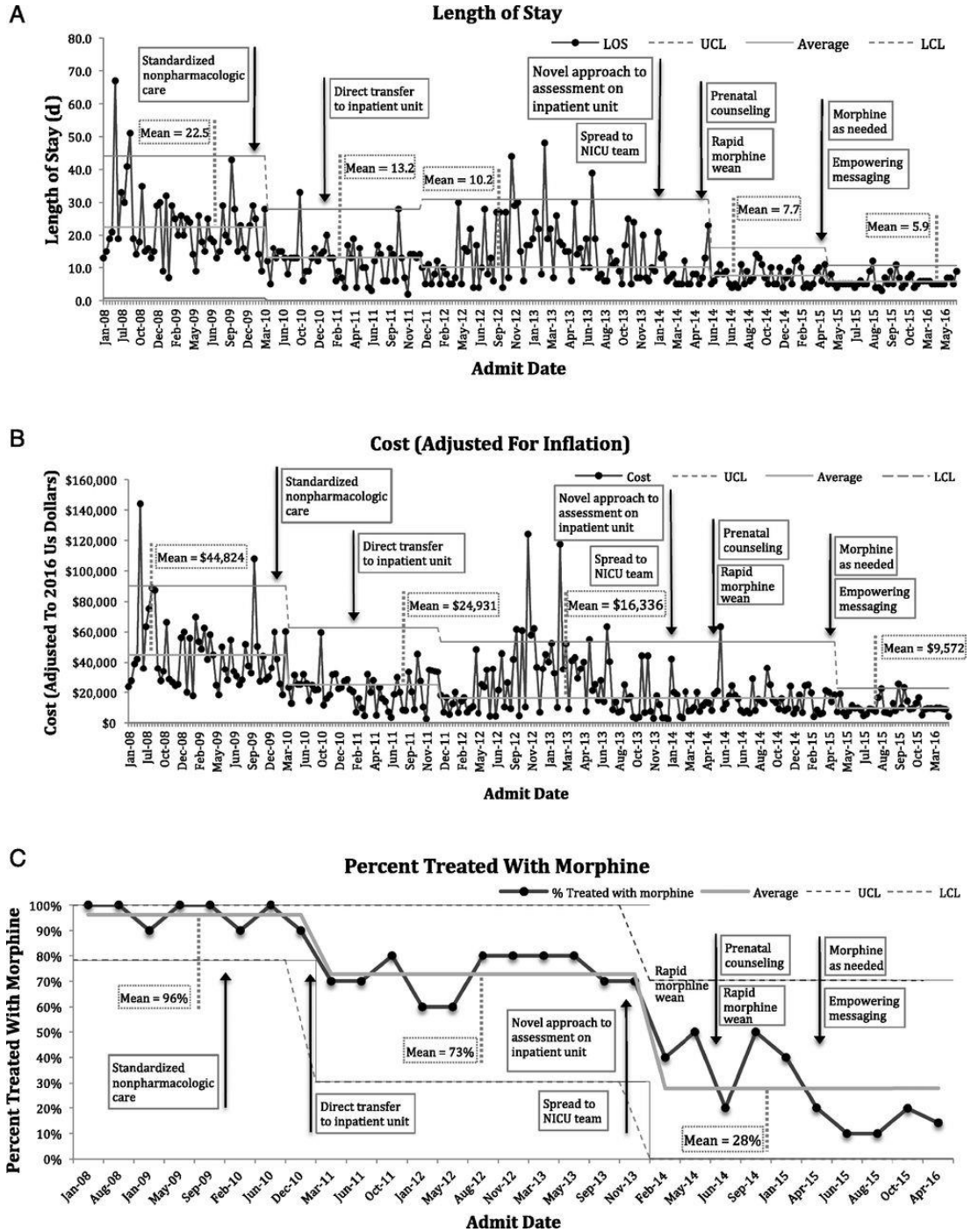
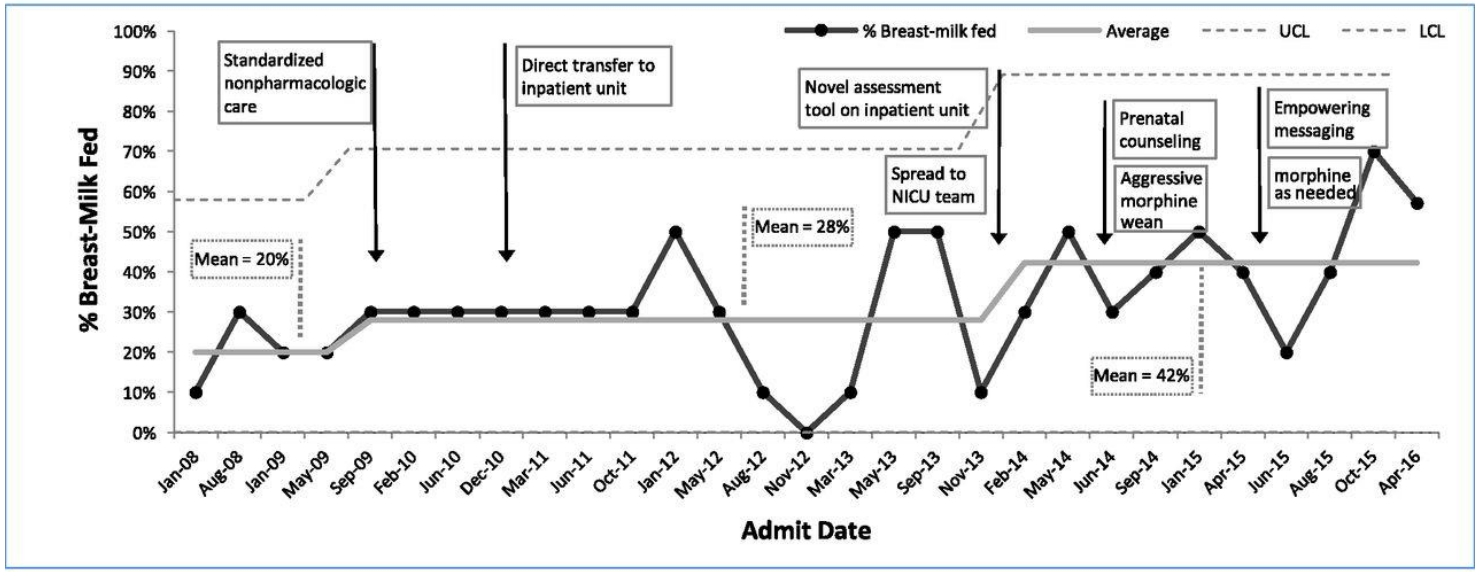
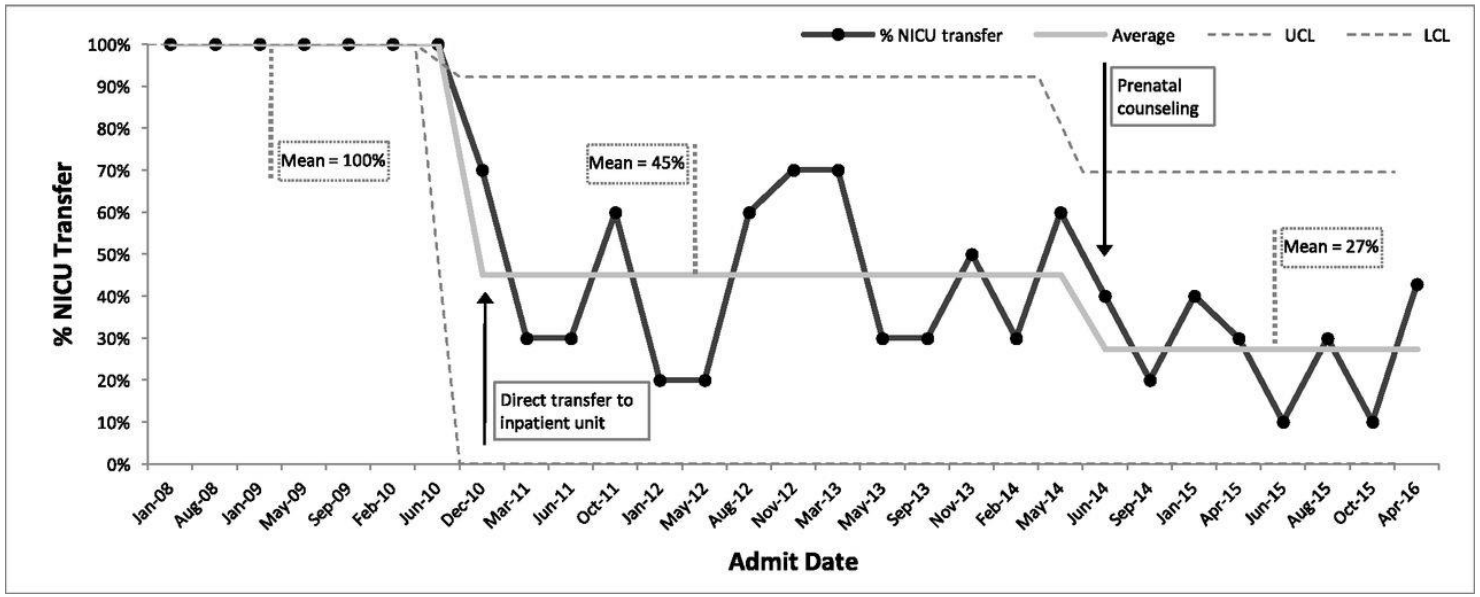
- Standardized non-pharmacological interventions
  - -Low stimulation environment
  - -Continuous engagement of parents in the care of infants
  - -Staff trained to view non-pharmacologic indications as equivalent to medications
  - -Encourage breastfeeding when there are no contraindications
- Prenatal counseling
- Empowerment of families
- Simplified assessment: Eat, Sleep, Console


A
Length of Stay
LOS
UCL
Average
LCL
Length of Stay (d)
Admit Date
Standardized nonpharmacologic care
Direct transfer to inpatient unit
Novel approach to assessment on inpatient unit
Spread to NICU team
Prenatal counseling
Rapid morphine wean
Morphine as needed
Empowering messaging
Mean = 22.5
Mean = 13.2
Mean = 10.2
Mean = 7.7
Mean = 5.9
B
Cost (Adjusted For Inflation)
Cost
UCL
Average
LCL
Cost (Adjusted To 2016 Us Dollars)
Admit Date
Standardized nonpharmacologic care
Direct transfer to inpatient unit
Novel approach to assessment on inpatient unit
Spread to NICU team
Prenatal counseling
Rapid morphine wean
Morphine as needed
Empowering messaging
Mean = $44,824
Mean = $24,931
Mean = $16,336
Mean = $9,572
C
Percent Treated With Morphine
% Treated with morphine
Average
UCL
LCL
Percent Treated With Morphine
Admit Date
Mean = 96%
Mean = 73%
Mean = 28%
Standardized nonpharmacologic care
Direct transfer to inpatient unit
Novel approach to assessment on inpatient unit
Spread to NICU team
Rapid morphine wean
Prenatal counseling
Rapid morphine wean
Morphine as needed
Empowering messaging

A


Percent With ≥ 50% Of Feeds As Breast Milk At Discharge
% Breast-milk fed
Average
UCL
LCL
% Breast-Milk Fed
Standardized nonpharmacologic care
Direct transfer to inpatient unit
Novel assessment tool on inpatient unit
Spread to NICU team
Prenatal counseling
Aggressive morphine wean
Empowering messaging
morphine as needed
Mean = 20%
Mean = 28%
Mean = 42%
Admit Date

B


Percent Transferred to NICU
% NICU transfer
Average
UCL
LCL
% NICU Transfer
Prenatal counseling
Mean = 100%
Mean = 45%
Mean = 27%
Direct transfer to inpatient unit
Admit Date

MMC Clinical Transformation Project

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

PDSA Cycles	
1	Taskforce established; baseline data collected
2	Simulation-based ESC team training (Gold Star raters)
3	Development of patient materials and EMR documentation
4	Staff training
5	Development of PRN medication guidelines

Eat, sleep, console

- This method of assessing infants with NAS was developed by a collaborative effort between faculty at Yale, Children's Hospital at Dartmouth-Hitchcock, and Boston Medical Center.

- The ESC Care Tool **only documents items key to the functioning of the infant – specifically, the infant's ability to eat effectively, sleep, and be consoled within a reasonable amount of time.**

- The ESC method's sole principle is that the treatment of the infant (both non-pharm and pharmacologic treatment) should be based on **infant function and comfort, rather than reducing signs and symptoms of withdrawal.**

EATING, SLEEPING, CONSOLING (ESC) CARE TOOL

- Educate parent in **ESC assessments, use of Newborn Care Diary** and **requesting infant assessment after feedings.**
- Assess infant **after feedings**, preferably while **skin-to-skin or held swaddled** by mother/caregiver.
- Review baby's **ESC** behaviors with parents **since last assessment 3-4 hours ago** using **Newborn Care Diary.**
- If infant with **"Yes"** for any **ESC** item or **"3" 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 **"3" for "Soothing Support"** despite **maximal non-pharm care,** perform **full team huddle** with mother/caregiver, RN and infant's physician/associate 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 Continue medication treatment: 3 Other (please describe):								
NON-PHARM CARE RECOMMENDATIONS								
Rooming-in with additional help: Increase / Reinforce								
Parental presence: Increase / Reinforce								
Skin-to-skin contact: Increase / Reinforce								
Holding by caregiver / cuddler: Increase / Reinforce								
Swaddling: Increase / Reinforce								
Optimal feeding: Increase / Reinforce								
Quiet, low light environment: Increase / Reinforce								
Non-nutritive sucking / pacifier use: Increase / Reinforce								
Limit visitors: Increase / Reinforce								
Clustering care: Increase / Reinforce								
Safe sleep / fall prevention: Increase / Reinforce								
Optional Comments:								

Non-Pharmacological Care

- Skin to skin contact with parents
- Decreased stimulation (light, noise, and tactile)
- Swaddling
- Use of pacifiers
- Breastfeeding

EATING

The first component of the ESC Care Tool is infant feeding:

"Does the infant have poor eating due to NAS – Yes / No?"

Adequate eating depends on the **gestational** and **postnatal age** of the infant. "Eating well" is generally defined as breastfeeding 8-12 times per day with effective latch and milk transfer, or bottle feeding an expected volume for age when showing hunger cues.

Poor eating due to NAS: Baby is **unable to coordinate feeding** within 10 minutes of showing hunger *AND/OR* is unable to sustain feeding for 10 minutes at breast or take at least 10 mL (or other age-appropriate volume) by alternate feeding method (e.g., bottle) due to NAS symptoms (e.g., fussiness, tremors, uncoordinated or excessive suck).

SLEEPING

The second component of the ESC Care Tool is infant sleep:

"Did the infant sleep less than 1 hour after feeding due to NAS – Yes / No?"

- **Sleep < 1 hour due to NAS:** Baby unable to sleep for at least one hour after feeding due to NAS symptoms (e.g., fussiness, restlessness, increased startle, tremors).

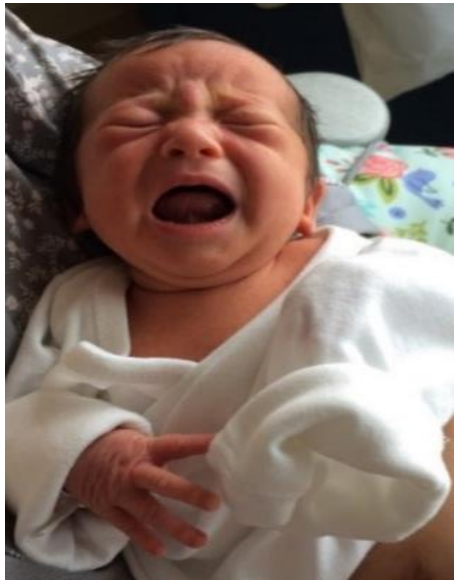
- **Special Note: Do not** indicate "Yes" if sleep < 1 hour is clearly due to non-NAS related factors (e.g., physiologic cluster feeding in first few days of life, interruptions in sleep for routine newborn testing, symptoms in first day likely due to nicotine or SSRI withdrawal).

If it is not clear if sleep < 1 hour is due to NAS, indicate "Yes" on the ESC Care Tool / flowsheet and continue to monitor the infant closely while optimizing all non-pharm interventions.

CONSOLING

- The final symptom component of the ESC Care Tool is infant consoling:

"Is the infant unable to be consoled within 10 minutes due to NAS – Yes/No?"

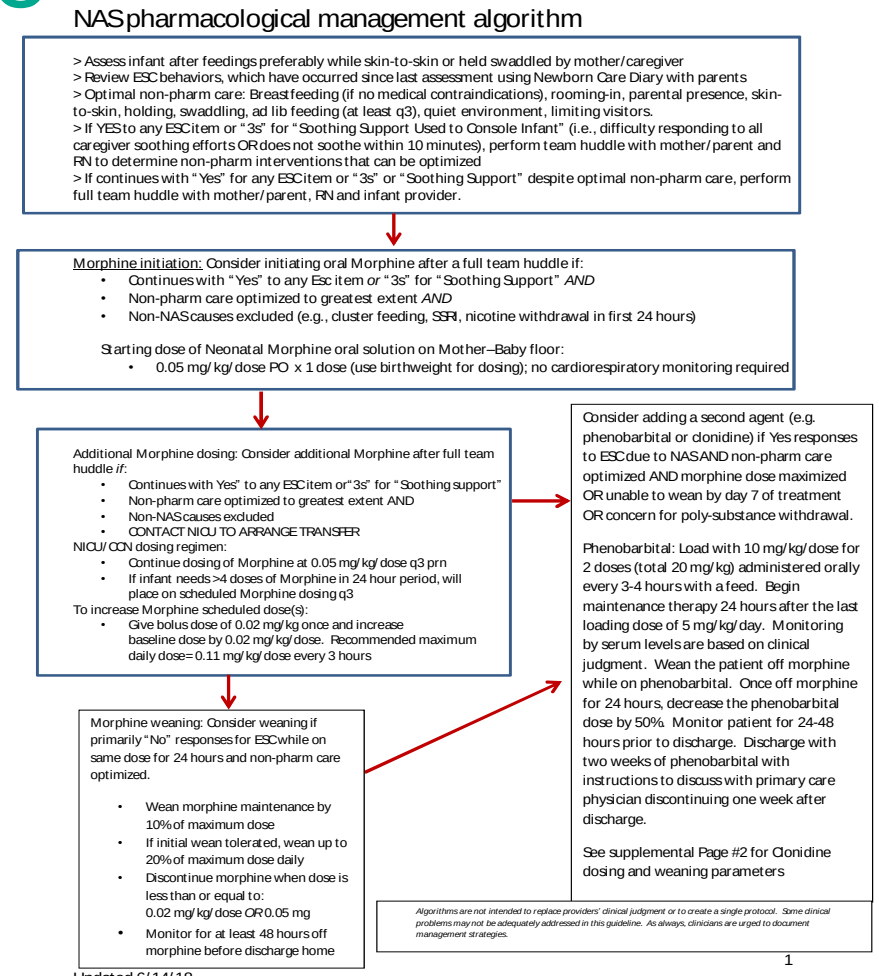


Unable to console within 10 minutes due to NAS: Baby unable to be consoled within 10 minutes by infant caregiver effectively providing recommended Consoling Support Interventions.

Special Note: **Do not** indicate "Yes" if infant's inconsolability is due to infant hunger, difficulty feeding or other non-NAS source of discomfort (e.g., circumcision pain) or non-opioid withdrawal.

If it is not clear if the inability to console within 10 minutes is due to NAS, please indicate "Yes" and continue to monitor the infant closely while optimizing all non-pharm interventions.

PRN morphine



Prenatal Education

- The discussion starts prior to delivery!
- At MMC-Portland, the Pediatric Newborn service provides outpatient ”ESC Consults” for moms on Medication-Assisted Treatment in situ at the MMC OBGyn Clinic
  - Ideally at the 32-week visit
  - Cover many topics
    - Who are your support people? What is your history of substance use? Who are we allowed to talk to openly while you are hospitalized?
    - What is your feeding plan?
    - What is NOWS? How do we monitor it? How do we treat it? What is the parents’ role? How long can they expect to stay in the hospital?
    - Toxicology testing – of mom and infant
    - Community resources
    - Mandatory social work consult and DHHS report

Family education

Maine Resources

INFORMATION ON NAS

March of Dimes
www.marchofdimes.org/complications/neonatal-abstinence-syndrome-(nas).aspx

SUBSTANCE ABUSE RESOURCES

MaineHealth Learning Resource Center
1 (866) 609-5183
www.mainehealthlearningcenter.org/resources/treatment-for-drug-addiction

Maine Alliance for Addiction Recovery (MAAR)
Free recovery support program and recovery housing help.
(207) 621-8118

Office of Substance Abuse Information & Resource Center
1 (800) 499-0027

Substance Abuse & Mental Health Services Administration
www.samhsa.gov

The Woman's Project
(207) 523-5049

RESOURCES FOR NEW PARENTS

Public Health Nursing in Maine (Statewide Central Referral)
1 (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.

Classes at MMC
www.mmc.org/childbirth-parenting-education

MMC New Parent Website
www.mmc.org/parent-resources

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INFORMATION FOR PREGNANT WOMEN

Neonatal Abstinence Syndrome (NAS)

The Barbara Bush Children's Hospital
At Maine Medical Center
bbch.org

Family education

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 breast feed 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.

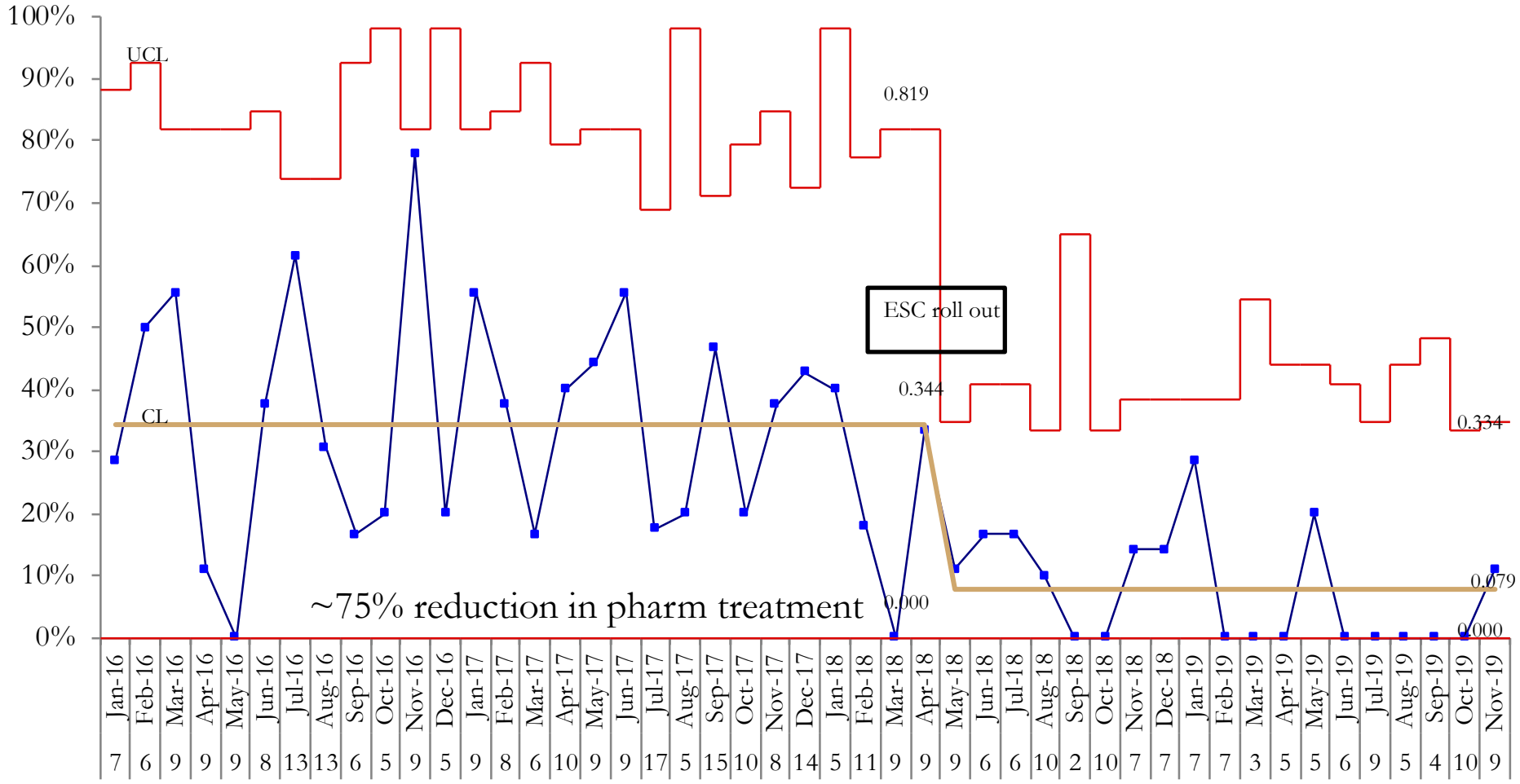
Results of MMC Clinical Transformation Project…

Impact of ESC at Maine Medical Center

- Reduction in rate of ANY pharmacologic treatment from 35% to 8%
- Lowered the total average doses of morphine administered per patient by 80%
- Reduced our overall length of stay
- Cost savings to our institution

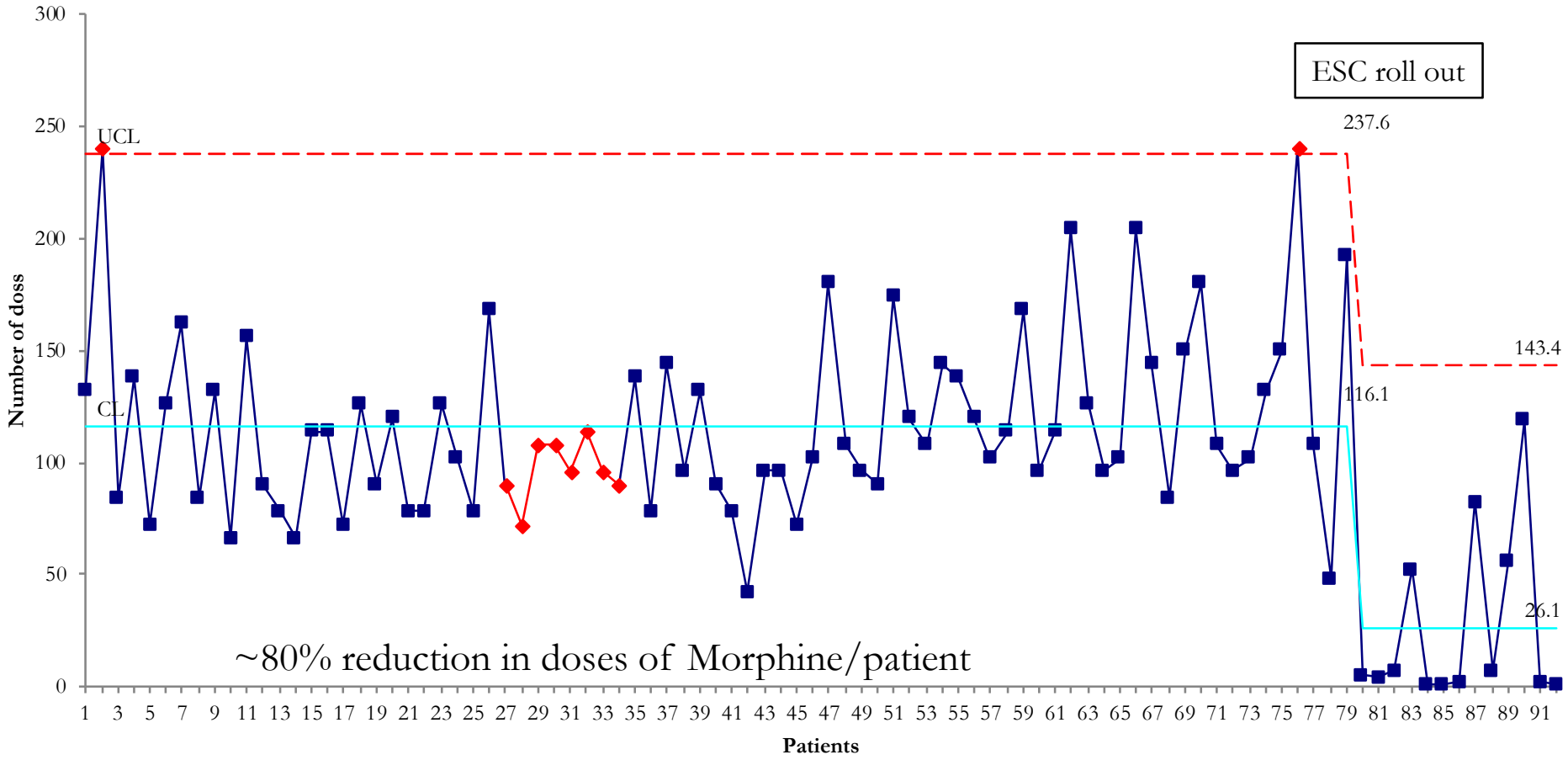
Slide courtesy of Dr. Alan Picarillo

Pharmacologically treated OEN ≥35 weeks (P-chart)

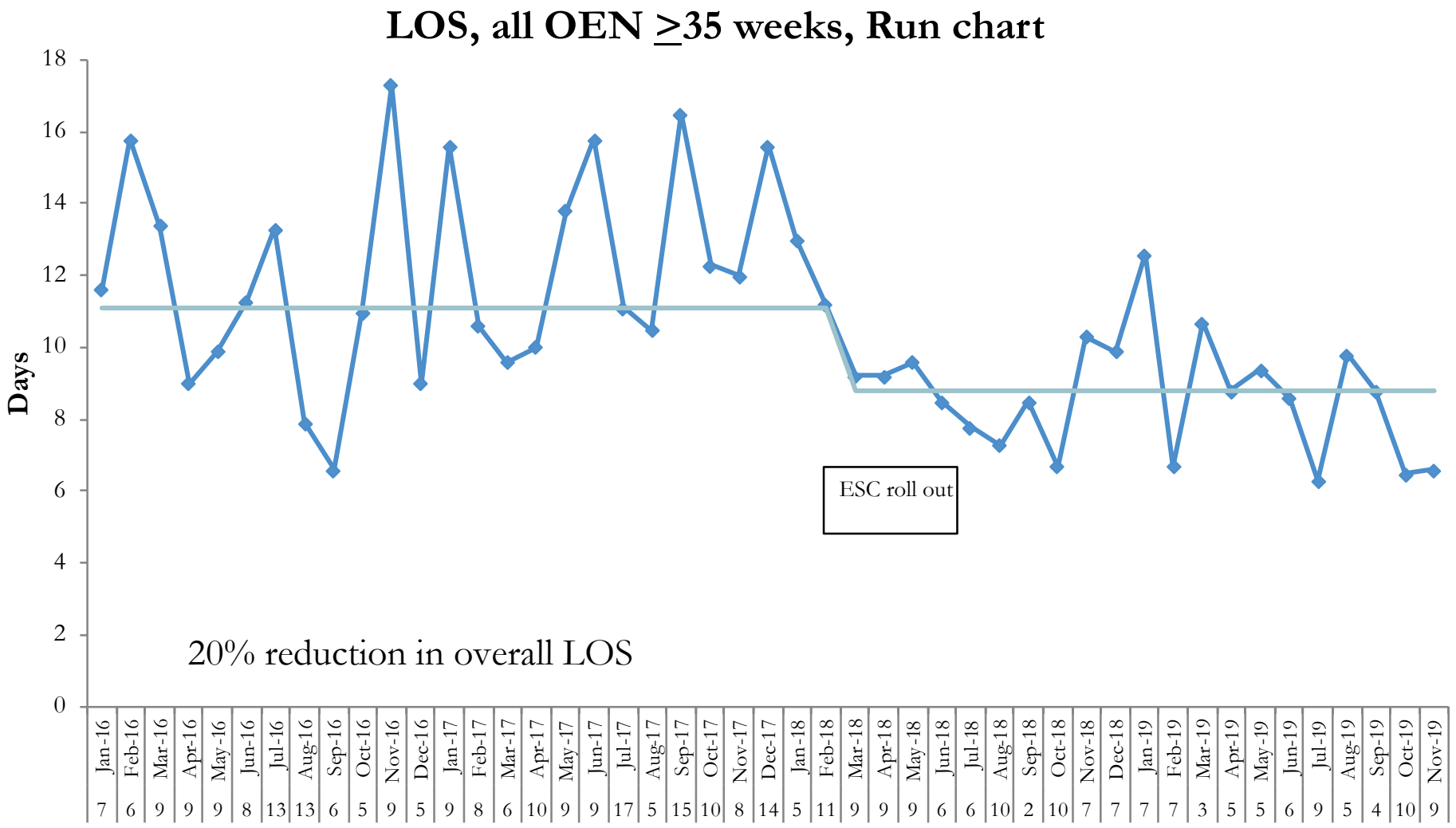


Slide courtesy of Dr. Alan Picarillo

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

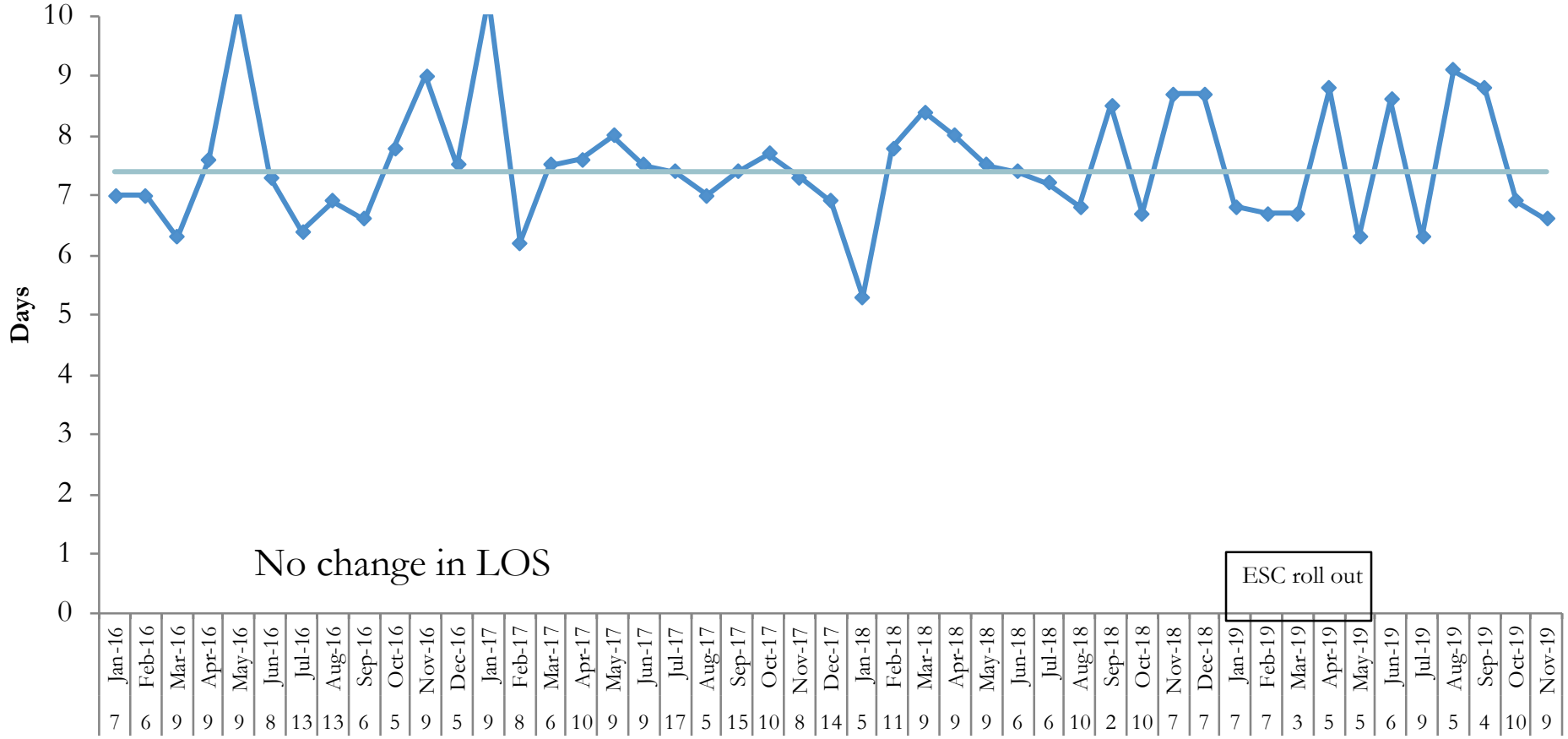


Slide courtesy of Dr. Alan Picarillo



Slide courtesy of Dr. Alan Picarillo

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



Slide courtesy of Dr. Alan Picarillo

Going Home…

- Shorter hospital stays have implications for discharge
- Hospital discharge from a typical birth hospitalization for NOWS is on DOL 5-7. Infants are usually feeding well, gaining weight, and parents have demonstrated the ability to care for them independently
- DHHS referral for EVERY opioid exposed newborn, social work consultation and services offered/mandated: CradleME: Maine Families, WIC, Public Health Nursing, MaineMOM and CDS Early Intervention
- PCP appointment scheduled, +/- warm handoff

Cost of care

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

Anticipated cost savings in 2019:

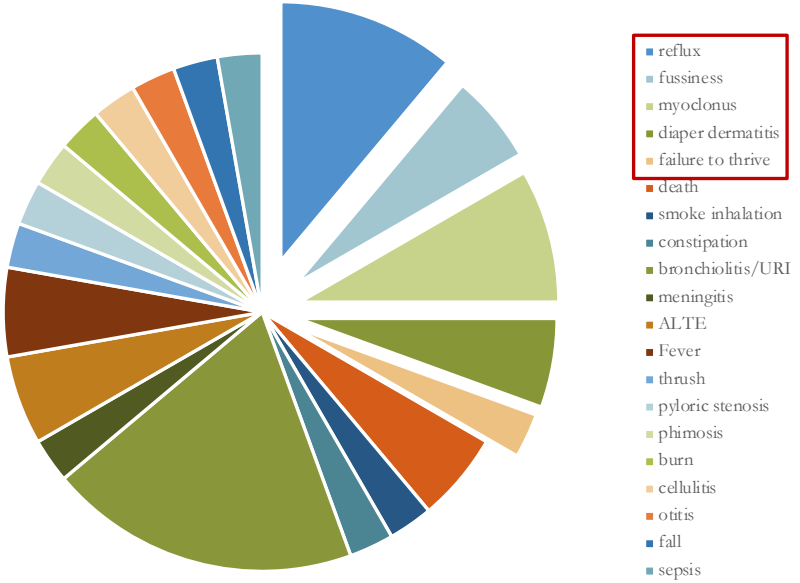
Direct cost savings $432k

Total cost savings $870k

Slide courtesy of Dr. Alan Picarillo

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%



Slide courtesy of Dr. Alan Picarillo

Family experience…

“There isn’t a barrier between mom and nursing anymore. I’m not intimidated like I was with Finnegan. I feel like I am a big part of his care and I know what to do to help him.

Finnegan felt overwhelming and scary and I felt like I was being continually judged where with ESC I know I’m the most important part of his care”

-MOB with infant exposed to Subutex and nicotine

-1st child scored with Finnegan, 2nd child born early and remained in NICU, 3rd child assessed with ESC

Next steps

- Developmental follow up, pharmacologically vs non-pharmacologically treated infants
- Patient experience comparing ESC to traditional treatment paradigm
- Need for enhanced family support during hospitalization.
- Impact of COVID-19 pandemic and social distancing on family coping mechanisms?

Thank you!